





P18-0044 (05)







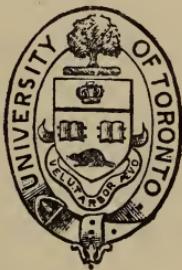
THE

397

# CALENDAR

OF THE

# University of Toronto



FACULTY OF

APPLIED SCIENCE AND ENGINEERING

1920-1921

UNIVERSITY OF TORONTO PRESS

sent to  
Stewart & London

McGowan

Wright Cockburn

Angus

Bain

Waulkmill & Goss

Roseburgh

## CONTENTS.

	PAGE
CALENDAR.....	5
FACULTY LISTS.....	7
HISTORICAL SKETCH.....	13
GRADUATING DEPARTMENTS.....	14
PROFESSIONAL DEGREES.....	14, 73
MASTER OF APPLIED SCIENCE DEGREE.....	73
JUNIOR INSTRUCTORSHIPS .....	14
MATRICULATION.....	15
ADMISSION AND REGISTRATION.....	16
TUITION FEES, DEPOSITS, ETC.....	16, 17
INFORMATION FOR STUDENTS.....	18
DEPARTMENT OF CIVIL ENGINEERING.....	23
"        MINING ENGINEERING.....	25
"        MECHANICAL ENGINEERING.....	28
"        ARCHITECTURE .....	31
"        ANALYTICAL AND APPLIED CHEMISTRY .....	33
"        CHEMICAL ENGINEERING .....	34
"        ELECTRICAL ENGINEERING.....	36
"        METALLURGICAL ENGINEERING.....	38
OUTLINE OF COURSES OF INSTRUCTION.....	40
LABORATORY EQUIPMENTS.....	75
LIBRARY.....	86
ROYAL ONTARIO MUSEUM.....	87
ENGINEERING SOCIETY.....	88
STUDENT SOCIETIES.....	89
LODGING AND BOARD, RESIDENCES.....	95
STUDENTS IN ATTENDANCE.....	97
GRADUATES.....	106
INDEX TO GRADUATES.....	170

1920

## CALENDAR

1920

JANUARY		FEBRUARY		MARCH		APRIL	
Sun. . . 4 11 18 25		Sun. . . 1 8 15 22 29		Sun. . . 7 14 21 28		Sun. . . 4 11 18 25	
Mon. . . 5 12 19 26		Mon. . . 2 9 16 23 ..		Mon. . . 1 8 15 22 29		Mon. . . 5 12 19 26	
Tues. . . 6 13 20 27		Tues. . . 3 10 17 24 ..		Tues. . . 2 9 16 23 30		Tues. . . 6 13 20 27	
Wed. . . 7 14 21 28		Wed. . . 4 11 18 25 ..		Wed. . . 3 10 17 24 31		Wed. . . 7 14 21 28	
Thur. . . 1 8 15 22 29		Thur. . . 5 12 19 26 ..		Thur. . . 4 11 18 25 ..		Thur. . . 1 8 15 22 29	
Fri. . . 2 9 16 23 30		Fri. . . 6 13 20 27 ..		Fri. . . 5 12 19 26 ..		Fri. . . 2 9 16 23 30	
Sat. . . 3 10 17 24 31		Sat. . . 7 14 21 28 ..		Sat. . . 6 13 20 27 ..		Sat. . . 3 10 17 24 ..	
MAY		JUNE		JULY		AUGUST	
Sun. . . 2 9 16 23 30		Sun. . . 6 13 20 27		Sun. . . 4 11 18 25		Sun. . . 1 8 15 22 29	
Mon. . . 3 10 17 24 31		Mon. . . 7 14 21 28		Mon. . . 5 12 19 26		Mon. . . 2 9 16 23 30	
Tues. . . 4 11 18 25 ..		Tues. . . 8 15 22 29		Tues. . . 6 13 20 27		Tues. . . 3 10 17 24 31	
Wed. . . 5 12 19 26 ..		Wed. . . 9 16 23 30		Wed. . . 7 14 21 28		Wed. . . 4 11 18 25 ..	
Thur. . . 6 13 20 27 ..		Thur. . . 10 17 24 ..		Thur. . . 8 15 22 29		Thur. . . 5 12 19 26 ..	
Fri. . . 7 14 21 28 ..		Fri. . . 11 18 25 ..		Fri. . . 9 16 23 30		Fri. . . 6 13 20 27 ..	
Sat. . . 8 15 22 29 ..		Sat. . . 12 19 26 ..		Sat. . . 10 17 24 31		Sat. . . 7 14 21 28 ..	
SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
Sun. . . 5 12 19 26		Sun. . . 3 10 17 24 31		Sun. . . 7 14 21 28		Sun. . . 5 12 19 26	
Mon. . . 6 13 20 27		Mon. . . 4 11 18 25 ..		Mon. . . 8 15 22 29		Mon. . . 6 13 20 27	
Tues. . . 7 14 21 28		Tues. . . 5 12 19 26 ..		Tues. . . 9 16 23 30		Tues. . . 7 14 21 28	
Wed. . . 8 15 22 29 ..		Wed. . . 6 13 20 27 ..		Wed. . . 10 17 24 ..		Wed. . . 8 15 22 29 ..	
Thur. . . 9 16 23 30		Thur. . . 7 14 21 28 ..		Thur. . . 11 18 25 ..		Thur. . . 9 16 23 30	
Fri. . . 10 17 24 ..		Fri. . . 8 15 22 29 ..		Fri. . . 12 19 26 ..		Fri. . . 10 17 24 31	
Sat. . . 11 18 25 ..		Sat. . . 9 16 23 30 ..		Sat. . . 13 20 27 ..		Sat. . . 11 18 25 ..	

1921

## CALENDAR

1921

JANUARY		FEBRUARY		MARCH		APRIL	
Sun. . . 2 9 16 23 30		Sun. . . 6 13 20 27		Sun. . . 6 13 20 27		Sun. . . 3 10 17 24 ..	
Mon. . . 3 10 17 24 31		Mon. . . 7 14 21 27		Mon. . . 7 14 21 28		Mon. . . 4 11 18 25 ..	
Tues. . . 4 11 18 25 ..		Tues. . . 8 15 22 28		Tues. . . 8 15 22 29		Tues. . . 5 12 19 26 ..	
Wed. . . 5 12 19 26 ..		Wed. . . 9 16 23 ..		Wed. . . 9 16 23 30		Wed. . . 6 13 20 27 ..	
Thur. . . 6 13 20 27 ..		Thur. . . 10 17 24 ..		Thur. . . 10 17 24 31		Thur. . . 7 14 21 28 ..	
Fri. . . 7 14 21 28 ..		Fri. . . 11 18 25 ..		Fri. . . 11 18 25 ..		Fri. . . 8 15 22 29 ..	
Sat. . . 8 15 22 29 ..		Sat. . . 12 19 26 ..		Sat. . . 12 19 26 ..		Sat. . . 9 16 23 30 ..	
MAY		JUNE		JULY		AUGUST	
Sun. . . 1 8 15 22 29		Sun. . . 5 12 19 26		Sun. . . 3 10 17 24 31		Sun. . . 7 14 21 28	
Mon. . . 2 9 16 23 30		Mon. . . 6 13 20 27		Mon. . . 4 11 18 25 ..		Mon. . . 8 15 22 29	
Tues. . . 3 10 17 24 31		Tues. . . 7 14 21 28		Tues. . . 5 12 19 26 ..		Tues. . . 9 16 23 30	
Wed. . . 4 11 18 25 ..		Wed. . . 8 15 22 29		Wed. . . 6 13 20 27 ..		Wed. . . 10 17 24 31	
Thur. . . 5 12 19 26 ..		Thur. . . 9 16 23 30		Thur. . . 7 14 21 28 ..		Thur. . . 4 11 18 25 ..	
Fri. . . 6 13 20 27 ..		Fri. . . 10 17 24 ..		Fri. . . 8 15 22 29 ..		Fri. . . 5 12 19 26 ..	
Sat. . . 7 14 21 28 ..		Sat. . . 11 18 25 ..		Sat. . . 9 16 23 30 ..		Sat. . . 13 20 27 ..	
SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
Sun. . . 4 11 18 25		Sun. . . 2 9 16 23 30		Sun. . . 6 13 20 27		Sun. . . 4 11 18 25	
Mon. . . 5 12 19 26		Mon. . . 3 10 17 24 31		Mon. . . 7 14 21 28		Mon. . . 5 12 19 26	
Tues. . . 6 13 20 27		Tues. . . 4 11 18 25 ..		Tues. . . 8 15 22 29		Tues. . . 6 13 20 27	
Wed. . . 7 14 21 28		Wed. . . 5 12 19 26 ..		Wed. . . 9 16 23 30		Wed. . . 7 14 21 28	
Thur. . . 8 15 22 29		Thur. . . 6 13 20 27 ..		Thur. . . 10 17 24 ..		Thur. . . 8 15 22 29 ..	
Fri. . . 9 16 23 30		Fri. . . 7 14 21 28 ..		Fri. . . 11 18 25 ..		Fri. . . 9 16 23 30	
Sat. . . 10 17 24 ..		Sat. . . 8 15 22 29 ..		Sat. . . 12 19 26 ..		Sat. . . 10 17 24 31	

## CALENDAR 1920-1921

- 1920—Aug. 21 Saturday.....Students Third Year, Dept. 1, report at Gelert Camp.
- Sept. 2 Thursday.....Students Third Year, Dept. 2, report at Gelert Camp.
- Sept. 15 Wednesday...Last day for receiving applications for supplemental examinations.
- Sept. 24 Friday.....Supplemental examinations begin.
- Sept. 27 Monday.....Meeting of Faculty Council.  
Enrolment.
- Sept. 28 Tuesday.....Academic year begins at 9 a.m.  
Opening address by the President to students of all Faculties at 3 p.m. in Convocation Hall.
- Last day for receiving vacation work.
- Oct. 1 Friday.....Meeting of Faculty Council.
- Oct. 8 Friday.....Meeting of Senate.
- Oct. 9 Saturday.....Stated meeting of the Caput to deal with requests as to Social Functions until November 15.
- Oct. 13 Wednesday...Meeting of Engineering Society.
- Oct. 27 Wednesday...Meeting of Engineering Society.
- Nov. 5 Friday.....Meeting of Faculty Council.
- Nov. 10 Wednesday...Meeting of Engineering Society.
- Nov. 12 Friday.....Meeting of Senate.
- Nov. 24 Wednesday...Meeting of Engineering Society.
- Dec. 3 Friday.....Meeting of Faculty Council.
- Dec. 8 Wednesday...Meeting of Engineering Society.
- Dec. 10 Friday.....Meeting of Senate.
- Dec. 17 Friday.....First Term ends at 12 noon.

- 1921—Jan. 4 Tuesday.....Second Term begins.  
Last day for receiving Theses for B.A.Sc.
- Jan. 7 Friday.....Assemblage of students of all Faculties in Convocation Hall, 12.10 p.m.  
Meeting of Faculty Council.
- Jan. 12 Wednesday...Meeting of Engineering Society.
- Jan. 14 Friday.....Meeting of Senate.
- Jan. 26 Wednesday...Meeting of Engineering Society.
- Feb. 4 Friday.....Meeting of Faculty Council.
- Feb. 9 Wednesday...Meeting of Engineering Society.
- Feb. 11 Friday.....Meeting of Senate.
- Feb. 23 Wednesday...Meeting of Engineering Society.
- Mar. 4 Friday.....Meeting of Faculty Council.
- Mar. 9 Wednesday...Meeting of Engineering Society.
- Mar. 11 Friday.....Meeting of Senate.  
Annual elections of Engineering Society.

Mar. 23 Wednesday...Annual meeting of Engineering Society.  
Mar. 25 Friday.....Good Friday—Buildings Closed.  
Apr. 1 Friday.....Meeting of Faculty Council.  
                            Meeting of Senate.  
Apr. 5 Tuesday.....Second Term ends.  
Apr. 9 Saturday.....Annual Examinations begin.  
May 6 Friday.....Meeting of Faculty Council.  
May 13 Friday.....Meeting of Senate.  
June 8 Wednesday...Meeting of Senate.  
June 10 Friday.....Annual Commencement.

# University of Toronto.

## FACULTY OF APPLIED SCIENCE AND ENGINEERING.

President..... SIR ROBERT A. FALCONER, K.C.M.G., LL.D., D.Litt.

→ Dean of Faculty... BRIG.-GENERAL C. H. MITCHELL, C.B., C.M.G.,  
D.S.O., C.E., LL.D.

Secretary of Faculty..... A. T. LAING, B.A.Sc.  
Bursar..... F. A. MOURÉ, Esq.

G. R. ANDERSON, M.A. ✓ 72 Isabella Street.

Associate Professor of Physics.

R. W. ANGUS, B.A.Sc., Mem. Am. Soc. M.E. ✓ 42 Howland Ave.

Professor of Mechanical Engineering.

E. G. R. ARDAGH, B.A.Sc., ✓ Chem. & Mining Bldg.

Associate Professor of Chemical Engineering.

L. M. ARKLEY, M.Sc., M.E.I.C. 61 Indian Rd. Crescent.

Assistant Professor of Mechanical Engineering.

J. W. BAIN, B.A.Sc., F.I.C., 393 Brunswick Ave.

Professor of Chemical Engineering.

M. C. BOSWELL, M.A., Ph.D., University of Toronto.

Associate Professor of Organic Chemistry.

J. T. BURT-GERRANS, M.A., Phm.B., 46 Dewson St.

Assistant Professor of Electrochemistry.

J. R. COCKBURN, M.C., B.A.Sc., A.M.E.I.C. 100 Walmer Rd.

Associate Professor of Descriptive Geometry.

S. R. CRERAR, B.A.Sc., D.L.S., 122 Grenadier Rd.

Assistant Professor of Surveying.

W. HODGSON ELLIS, M.A., M.B., LL.D. ~~Died~~ 86 Woodlawn Ave. E.

Professor Emeritus of Applied Chemistry.

P. GILLESPIE, M.Sc., C.E., M.E.I.C. 358 Davenport Rd.

Associate Professor of Applied Mechanics.

G. A. GUSS, M.A., 147 1/4 Oakville.

Professor of Metallurgy.

H. E. T. HAULTAIN, C.E., M.I.M.M., 50 St. George St.

Professor of Mining Engineering.

A. T. LAING, B.A.Sc., 146 Balmoral Ave.

Assistant Professor of Applied Mechanics.

T. R. LOUDON, B.A.Sc., 189 Sheldrake Blvd.

Associate Professor of Ferro-Metallurgy.

A. WELLESLEY McCONNELL, B.A.Sc., 36 Prince Arthur Avenue.

Associate Professor of Architecture.

J. McGOWAN, B.A., B.A.Sc., Engineering Building.

Professor of Applied Mechanics.

H. W. PRICE, B.A.Sc., <i>Professor of Electrical Engineering.</i>	474 Palmerston Ave.
T. R. ROSEBRUGH, M.A., <i>Professor of Electrical Engineering.</i>	92 Walmer Rd.
L. B. STEWART, O.L.S., D.T.S.; <i>Professor of Surveying and Geodesy.</i>	161 Admiral Rd.
J. J. TRAILL, B.A.Sc., <i>Assistant Professor of Hydraulics.</i>	15 Fulton Ave.
W. M. TREADGOLD, B.A., <i>Associate Professor of Surveying.</i>	13 Woodlawn Ave. E.
C. H. C. WRIGHT, B.A.Sc., Registered Architect <i>Professor of Architecture.</i>	419 Markham St.
C. R. YOUNG, B.A.Sc., C.E., M.E.I.C. <i>Associate Professor of Structural Engineering.</i>	98 Hilton Ave.

### Sessional Appointments.

J. L. BANKS, <i>Instructor in Modelling.</i>	178 Kingston Rd.
E. W. BANTING, B.A.Sc., <i>Lecturer in Surveying.</i>	101 Farnham Ave.
B. W. BEMROSE, B.A.Sc., <i>Demonstrator in Drawing.</i>	182 Western Ave.
S. G. BENNETT, M.C., B.A.Sc., <i>Lecturer in Commercial Engineering.</i>	16 Howland Ave.
H. J. BROWNLEE, M.A., <i>Lecturer in Chemical Engineering and Applied Chemistry.</i>	503 Clinton St.
A. R. CLUTE, B.A., LL.B., <i>Lecturer in Commercial Law.</i>	47 Elgin Ave.
H. E. DAVIS, <i>Demonstrator in Applied Mechanics.</i>	14 Spruce St.
W. B. DUNBAR, B.A.Sc., <i>Demonstrator in Drawing.</i>	18 Maitland St.
F. C. DYER, B.A.Sc., <i>Lecturer in Mining Engineering.</i>	233 Ashworth Ave.
W. R. FETZER, M.A., <i>Demonstrator in Electrochemistry.</i>	120 Brunswick Ave.
H. J. FRANKLIN, B.A.Sc., <i>Demonstrator in Drawing.</i>	351 Dovercourt Rd.
E. R. GRANGE, D.S.C., B.A.Sc., <i>Demonstrator in Drawing.</i>	34 Chicora Ave.
W. K. GREATREX, B.A.Sc., <i>Demonstrator in Drawing.</i>	85 Atlas Ave.
W. S. GUEST, B.A.Sc., <i>Lecturer in Electrical Engineering.</i>	30 McMaster Ave.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 9

K. B. JACKSON, B.A.Sc.,	34 Grosvenor St.
<i>Instructor in Engineering Physics and Photography.</i>	
C. W. JEFFERY, A.R.C.A., Mem. O.S.A.,	York Mills
<i>Instructor in Freehand Drawing.</i>	
J. T. KING, B.A.Sc.,	87 Pine Crest Rd.
<i>Lecturer in Mining Engineering.</i>	
S. J. KRUG, B.A.Sc.,	174 Howland Ave.
<i>Demonstrator in Chemical Engineering and Applied Chemistry.</i>	
MISS J. C. LAING, B.A.,	30 Pinewood Ave.
<i>Instructor in French.</i>	
H. M. LANCASTER, B.A.Sc.,	22 Palmerston Gardens
<i>Instructor in Chemical Engineering and Applied Chemistry.</i>	
J. M. LYLE,	19 Avondale Rd.
<i>Instructor in Architectural Design.</i>	
N. G. McDONALD, B.A.Sc.,	58 Alexander St.
<i>Demonstrator in Hydraulics.</i>	
D. F. McGUGAN, B.A.Sc.,	68 Gloucester St.
<i>Demonstrator in Drawing.</i>	
G. G. MACDONALD, B.A.Sc.,	88 Indian Grove
<i>Demonstrator in Chemical Engineering and Applied Chemistry.</i>	
H. H. MADILL, B.A.Sc., Registered Architect,	88 Woodlawn Ave. W.
<i>Lecturer in Architecture.</i>	
J. W. MELSON, B.A.Sc.,	69 Walmsley Blvd.
<i>Lecturer in Surveying.</i>	
W. E. MILLIGAN, B.A.Sc.,	20 Langley Ave.
<i>Lecturer in Metallurgy.</i>	
R. C. MITCHELL, B.A.Sc.,	210 Major St.
<i>Lecturer in Hydraulics.</i>	
F. J. MULQUEEN, D.S.O., M.C., B.A.Sc.,	118 St. George St.
<i>Demonstrator in Drawing.</i>	
W. H. ORR, B.A.Sc.,	442 Gladstone Ave.
<i>Demonstrator in Electrical Engineering.</i>	
J. H. PARKIN, B.A.Sc., M.E., Assoc. Mem. Am. Soc. M.E.,	
<i>Lecturer in Mechanical Engineering.</i>	10 Columbine Ave.
J. T. RANSOM, B.A.Sc., D. & O.L.S.,	47 Braemore Gardens
<i>Demonstrator in Surveying.</i>	
O. ROLFSON, M.A.Sc., D. & O.L.S.,	342 Brunswick Ave.
<i>Demonstrator in Chemical Engineering and Applied Chemistry.</i>	
H. C. ROSE, B.A.Sc.,	104 Durie St.
<i>Demonstrator in Drawing.</i>	
W. L. SAGAR, B.A.Sc.,	306 Jarvis St.
<i>Fellow in Applied Mechanics.</i>	
F. E. SIMPSON,	140 Grace St.
<i>Instructor in Modelling.</i>	
W. J. SMITHER, B.A.Sc., A.M.E.I.C.,	Pensax Court
<i>Lecturer in Structural Engineering.</i>	

10 UNIVERSITY OF TORONTO CALENDAR 1920-1921.

R. TAYLOR, B.A.Sc.,	35 Dorval Rd.
<i>Demonstrator in Electrical Engineering.</i>	
O. W. TITUS, B.A.Sc.,	45 Benlamond Ave.
<i>Demonstrator in Mechanical Engineering.</i>	
G. L. WALLACE, B.A.Sc.,	237 High Park Ave.
<i>Demonstrator in Engineering Physics and Photography.</i>	
G. H. WILKES, B.A.Sc.,	46 Elgin Ave.
<i>Lecturer in Machine Design.</i>	
A. C. WILSON, B.A.Sc.,	283 Evelyn Ave.
<i>Demonstrator in Drawing.</i>	
W. G. WOONTON, B.A.Sc.,	18 Suffolk Place.
<i>Demonstrator in Electrical Engineering.</i>	
G. R. WORKMAN, B.A.Sc.,	22 Helena Ave.
<i>Demonstrator in Drawing.</i>	
W. J. T. WRIGHT, B.A.Sc.,	419 Markham St.
<i>Lecturer in Drawing.</i>	
A. R. ZIMMER, B.A.Sc.,	80 Pine Crest Rd.
<i>Lecturer in Electrical Engineering.</i>	

*spac? bear?*

**MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION TO  
STUDENTS IN APPLIED SCIENCE.**

F. B. ALLAN, M.A., Ph.D., <i>Professor of Organic Chemistry</i>	380 Brunswick Ave.
S. BEATTY, Ph.D., <i>Assistant Professor of Mathematics.</i>	76 Pinewood Rd.
B. A. BENSLEY, B.A., Ph.D., <i>Professor of Zoology.</i>	37 Admiral Rd.
C. A. CHANT, M.A., Ph.D., <i>Professor of Astro-Physics.</i>	201 Madison Ave.
W. A. CLEMENS, M.A., Ph.D., <i>Assistant Professor of Elementary Biology.</i>	307 Dupont St.
A. P. COLEMAN, M.A., Ph.D., F.R.S., <i>Professor of Geology.</i>	476 Huron St.
A. T. DELURY, M.A., <i>Professor of Mathematics.</i>	University of Toronto
B. FAIRLEY, M.A., Ph.D., <i>Associate Professor of German.</i>	22 Kendal Ave.
J. H. FAULL, B.A., Ph.D., <i>Professor of Botany.</i>	102 Yorkville Ave.
J. G. FITZGERALD, M.B., <i>Professor of Hygiene.</i>	186 Balmoral Ave.
W. J. LOUDON, B.A., <i>Professor of Mechanics.</i>	Cooksville
M. A. MACKENZIE, M.A., F.I.A., <i>Professor of Mathematics.</i>	1 Bellwoods Park
A. MACLEAN, B.A., <i>Assistant Professor of Geology.</i>	60 College St.
W. L. MILLER, B.A., Ph.D., <i>Professor of Physical Chemistry.</i>	50 St. Albans St.
G. H. NEEDLER, B.A., Ph.D., <i>Professor of German.</i>	103 Bedford Rd.
W. A. PARKS, B.A., Ph.D., <i>Professor of Palaeontology.</i>	69 Albany Ave.
A. L. PARSONS, B.A., <i>Associate Professor of Mineralogy.</i>	47 St. Vincent St.
I. R. POUNDER, M.A., <i>Assistant Professor of Mathematics.</i>	46 Tranby Ave.
L. J. ROGERS, B.A.Sc., <i>Assistant Professor of Analytical Chemistry.</i>	29 Rosemount Ave.
E. M. WALKER, B.A., M.B., <i>Associate Professor of Biology.</i>	67 Alcina Ave.

12 UNIVERSITY OF TORONTO CALENDAR 1920-1921.

- T. L. WALKER, M.A., Ph.D.,  
*Professor of Mineralogy.* 20 Avondale Ave.
- J. S. WILL, B.A.,  
*Professor of French.* 56 Ranleigh Ave.

Sessional Appointments.

- H. S. MCKELLAR, B.A.,  
*Lecturer in French.* 139 Rushton Rd.
- J. E. THOMSON, B.A.Sc.,  
*Lecturer in Mineralogy.* 57 Queen's Park

## FACULTY OF APPLIED SCIENCE AND ENGINEERING.

### Historical Sketch.

The Legislative Assembly during the Session of 1877 gave its sanction to the establishment of a School of Practical Science on the basis proposed in the memorandum of the Minister of Education confirmed by the Lieutenant-Governor in Council on the 3rd day of February, 1877.

By the scheme thus approved of, Government effected an arrangement with the Council of University College whereby the students of the School of Practical Science enjoyed full advantage of the instruction given by its professors and lecturers in all the departments of science which were embraced in the work of the School.

This arrangement was brought to an end in 1889 by the transfer of the department of science above referred to, from University College to the University of Toronto under the operation of the University Federation Act.

In order that the students of the School might continue to enjoy the advantage of the instruction of the above departments, the Senate of the University of Toronto passed a Statute in October, 1889, affiliating the School to the University, which Statute was confirmed by the Lieutenant-Governor on the 30th day of October, 1889.

By an Order-in-Council, approved by the Lieutenant-Governor, on the 6th day of November, 1889, a Principal was appointed, and the management of the School was entrusted to a council composed of the Principal as chairman, and the Professors, Lecturers and Demonstrators appointed on the Teaching Faculty of the School.

By the terms of this order the management and discipline of the School was vested in the Council.

By a Statute of the Senate of the University of Toronto, passed on December 14th, 1900, the teaching staff and examiners of the School of Practical Science, together with the examiners for the degree of B.A.Sc., and professional degrees in Engineering, were constituted ex-officio the Faculty of Applied Science and Engineering of the University of Toronto.

By an Order-in-Council dated the 30th day of January, 1903, the Council of the School was made to consist of the Principal, the Professors and Lecturers, together with the Registrar.

By the University Act, 1906, the School of Practical Science was united to the University of Toronto as its Faculty of Applied Science and Engineering.

### **GRADUATING DEPARTMENTS.**

There are eight regular Departments of Instruction leading to the degree of Bachelor of Applied Science:—

1. Civil Engineering.
2. Mining Engineering.
3. Mechanical Engineering.
4. Architecture.
5. Analytical and Applied Chemistry.
6. Chemical Engineering.
7. Electrical Engineering.
8. Metallurgical Engineering.

The instruction given in these departments extends over a period of four years and is designed to give the student a thorough knowledge of the scientific principles underlying the practice in the several professions, and also such training as may make him immediately useful when he commences professional work.

### **DEGREE OF MASTER OF APPLIED SCIENCE (M.A.Sc.).**

(For requirements, see page 73.)

### **PROFESSIONAL DEGREES.**

Graduates in Applied Science and Engineering, and graduates of the School of Practical Science, may, after three years spent in professional work, present themselves for the degrees of Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem. E.), as the case may be, subject to the rules and regulations established by the University. (See page 73.)

### **JUNIOR INSTRUCTORSHIPS**

Provision is made for the sessional appointment in various departments of graduates as Fellows or Demonstrators, whose duties shall consist of aiding in the work of instruction under the direction of the department concerned.

Applications for appointment should be made in writing to the Secretary not later than September 1st.

### **SCHOLARSHIPS.**

The Boiler Inspection and Insurance Company of Canada offers a Scholarship in the Department of Mechanical Engineering of the value of \$130.00 to the student who obtains highest Honour Standing in the regular examinations of the third year.

The successful candidate will be expected to proceed to his fourth year during the session next following the date of the award.

The amount of the award will be credited by the Bursar to the fees of the fourth year of the successful candidate.

**MATRICULATION.**

1. The matriculation requirements of this Faculty are based upon those given in the curriculum for Junior Matriculation, a copy of which may be obtained on application.

2. A candidate for matriculation must produce satisfactory certificates of good character.

3. The requirements for admission comprise two parts which are as follows:

Part I, Pass Matriculation standing in the following subjects: English, History, Mathematics and three of Greek, Latin, French, German, Spanish, Experimental Science. The candidate is recommended to choose French, German and Experimental Science as his optional subjects in Part I.

Part II, Honour Matriculation standing as follows: Honours (at least 50 per cent.) in Honour Mathematics, Pass standing (at least 40 per cent.) in Honour English, Pass standing (at least 40 per cent.) in one of the following Honour subjects—Greek, Latin, French, German. The candidate is recommended to choose French as his option in Part II.

4. The pass matriculation standard is forty per cent. of the marks assigned to a paper, with an average of sixty per cent.

5. A candidate who has obtained an average of sixty per cent. on all the papers but has failed to obtain forty per cent. in not more than three papers may complete matriculation by passing on these papers at any one subsequent examination.

6. A candidate who has obtained forty per cent. on each of at least eight papers, with an average of sixty per cent. on the same, will be credited with these papers. In order to complete his Matriculation, he must obtain at one subsequent examination forty per cent. on each of the remaining papers, with an average of sixty per cent.

7. The examination for pass and honour Junior Matriculation is held annually in June at centres in Ontario, and, if application is made to the Senate, the examination may, with the co-operation of the Department of Education, be held at centres outside Ontario.

8. Applications accompanied by the fee of \$5.00 must be sent not later than the 15th of May to the local Public School Inspector, or in the case of candidates intending to write at the University, to the Registrar.

9. A Supplemental Matriculation examination at which pass and honour papers will be set, will be held in September at the University and at such other centres as may from time to time be authorized. Candidates entitled to the privileges of supplemental examinations, as well as new candidates, may present themselves at this examination.

10. Applications to write on the September examination, together with the necessary fee, must be received at the Department of Education not later than September 1, for those who wish to write at any centre

established in Ontario, and not later than August 1 for any centre elsewhere in Canada.

11. Forms of application, the time-table of the September examination, and further particulars may be had upon application to the Department of Education.

#### **ADMISSION.**

A candidate for admission must have completed the seventeenth year of his age on or before the first of October of the year in which he seeks to enter.

Applications for admission must be made on blank forms supplied by the Registrar, and should be forwarded as early as possible.

Applications will be considered from (a) those who have completed the pass and honour matriculation requirements, including those who hold certificates recognized as equivalent—see matriculation curriculum—, (b) those who have failed in not more than two papers of the pass matriculation examination. The latter must complete matriculation before being eligible to enter the second year.

Applications based upon other certificates than those mentioned will be considered as occasion may require. Such certificates must be accompanied by an official statement of the marks in the various subjects upon which the certificate was granted.

#### **ADMISSION AD EUNDUM STATUM.**

An undergraduate of another University may be admitted *ad eundem statum* on such conditions as the Senate on the recommendation of the Council of the Faculty may prescribe.

An applicant for admission *ad eundem statum* must submit with his petition (1) a calendar of his University giving a full statement of the courses of instruction; (2) an official certificate of character and academic standing.

#### **REGISTRATION.**

Registration in the various years will begin Sept. 1st. Blank cards for the purpose will be supplied by the Secretary on request. (See "Dues and Deposits," next page.)

#### **FEES.**

All fees are payable at the Bursar's office between the hours 10 a.m. and 1 p.m. of each week day except Saturday.

The annual fees including tuition, library, laboratory supplies and one annual examination shall be as follows:

#### **First Year.**

If paid in full on or before November 5th..... \$100.00

By instalments:

First instalment, if paid on or before November 5th..... 50.00

Second instalment, if paid on or before February 5th..... 55.00

**Second Year.**

If paid in full on or before November 5th.....	\$110.00
By instalments:	

First instalment, if paid on or before November 5th.....	55.00
Second instalment, if paid on or before February 5th.....	60.00

**Third and Fourth Years.**

If paid in full on or before November 5th.....	\$120.00
--	----------

By instalments:

First instalment, if paid on or before November 5th.....	60.00
Second instalment, if paid on or before February 5th.....	65.00

**Repeating the Year.**

If paid in full on or before November 5th.....	\$50.00
--	---------

The above fees are payable in advance. After November 5th a penalty of \$1.00 per month will be imposed until the whole amount is paid. In the case of payment by instalments the same rule as to penalty will apply.

Students desiring to pay in instalments must have paid the fees due in the first term before proceeding to the work of the second term.

**General Fees.**

Matriculation, or registration of Matriculation.....	\$ 5.00
Supplemental examination.....	10.00
Admission <i>ad eundem statum</i> .....	10.00
Hart House.....	10.00
Degree of B.A.Sc. (payable not later than April 1st).....	10.00
Degree of M.A.Sc.....	25.00

**Dues and Deposits.**

(Payable to the Secretary of the Faculty at the time of registration.)

Engineering Society membership.....	\$2.00
-------------------------------------	--------

Annual deposit, Departments 1, 3, 4, 7.....	2.00
---	------

Departments 2, 5, 6, 8.....	5.00
-----------------------------	------

Charges for waste, neglect and breakage are to be met out of the deposit fee, the balance of which will be refunded to the student at the end of the session.

**Women Students' Council Fee.**

The Annual Fee.....	\$2.00
---------------------	--------

A fee of two dollars shall be collected annually from the women students of the University of Toronto proceeding to a degree, with the exception of those in the Faculty of Education and the Department of Social Service, in order to secure for the Women Students' Administrative Council sufficient funds to carry on the work of their Council, including joint financial responsibility with the Men's Student Administrative Council in the publication of "Varsity" and "Torontonensis", and the payment of a General Secretary-Treasurer for the Women's Council.

### GENERAL INFORMATION FOR STUDENTS.

The Council of University College and the governing bodies of the federated universities and colleges, respectively, have disciplinary jurisdiction over and entire responsibility for the conduct of their students in respect of all matters arising or occurring in or upon their respective college buildings and grounds, including residences.

The councils of such of the faculties as have assigned for their separate use any building or buildings and grounds, including residences, have disciplinary jurisdiction over and entire responsibility for the conduct of all students in their respective faculties in respect of all matters arising or occurring in or upon such building, or buildings and grounds.

In all such cases, and, save as aforesaid, as respects all students to whatsoever college or faculty they may belong, disciplinary jurisdiction is vested in the Caput, but the Caput may delegate its authority in any particular case or by any general regulation to the council or other governing body of the university or college or faculty to which the student belongs.

The Caput has also power and authority to determine by general regulations, or otherwise, to what college, faculty or other body the control of university associations belongs.

If there be any questions as to the proper body to exercise jurisdiction in any matter of discipline which may arise, the same shall be determined by the Caput, whose decision shall be final.

Disciplinary jurisdiction includes the power to impose fines.

### HART HOUSE

Hart House, the gift of the Massey Foundation, is the new Undergraduates' Union of the University of Toronto.

Hart House contains completely equipped club rooms, including common rooms, reading room, music room, lecture room, sketch room, Camera Club rooms, the Great Hall, used as a Dining Hall, a small chapel, the offices and class rooms of the Y.M.C.A., Gymnasia and swimming pool, billiard room and the Hart House theatre.

All male students proceeding to a degree in the University are members of Hart House. The annual fee of \$10, imposed by the University, covers the fee of the Students' Administrative Council, all club fees in connection with Hart House, and membership in the Athletic Association, including medical examination.

Other male students in the University, or students in the affiliated or federated institutions receiving instruction in the University, may become members of Hart House on payment of the required fee.

Graduates are entitled to the full privileges of Hart House on payment of an annual fee of \$10.00.

A group of rooms is set apart for the use of the Faculty Union. There is also a common room for the use of graduates.

The Theatre is under the management of the Players' Club of the

University of Toronto, and is available for productions by any of the Dramatic Clubs within the University.

For further information, apply to the Warden of Hart House.

#### **REGULATIONS RESPECTING STUDENTS.**

No student will be enrolled in any year, or be allowed to continue in attendance, whose presence for any cause is deemed by the Council to be prejudicial to the interests of the University.

All interference on the part of any student with the personal liberty of another, by arresting him, or summoning him to appear before any unauthorized tribunal of students, or otherwise subjecting him to any indignity or personal violence, is forbidden by the Council. In particular, students of all Faculties are warned against the practices known as the "hustling" of freshmen and against inter-year or inter-faculty "hustles". Any student convicted of participation in such proceedings will render himself liable to expulsion from the University.

All students shall be in attendance during the whole of each term. Those whose attendance or work is reported as unsatisfactory are liable to dismissal by the Council.

No student will be allowed to repeat the work of any year more than once.

Information as to the text-books, instruments and materials to be purchased by the students will be given on registration at the beginning of the session.

#### **STUDENTS' ADMINISTRATIVE COUNCIL.**

The Students' Administrative Council has been entrusted by the Caput with supervision of the conduct of the students, and has disciplinary powers to deal with violations of the regulations governing conduct.

Any student who may be convicted of having taken part in a parade or procession through the city which has not been authorized by the police authorities after application by the Executive of the Students' Administrative Council, will be severely disciplined.

#### **PHYSICAL TRAINING**

By order of the Board of Governors each male student proceeding to a degree must take Physical Training in the first and second years of his attendance. He must first undergo a medical examination by the Physical Director of the University to determine the character of his training.

#### **OPTIONS.**

In the fourth year, optional courses are arranged in certain departments. Students are required to submit their selection to the Secretary in writing, not later than September 15th. The proposed selection must be approved by Council before adoption.

#### **REGULATIONS RESPECTING EXAMINATIONS.**

##### **Regular Examinations.**

Promotions from one year to another are made on the results of the annual examinations. Students proceeding to a degree must pass all the examinations in the subjects of his or her course and at the periods arranged from time to time by the Council.

Candidates who fail in passing the annual examinations will be required to take again the whole course of instruction, both theoretical and practical, of the year in which they fail before presenting themselves a second time for examination.

A student who in either term of the session fails to perform the work of his course in a manner satisfactory to the professors in charge, will not be allowed to present himself at the final examinations of the year.

In the second, third and fourth years annual examinations will be held at the beginning of the second term on all subjects completed during the first term.

No student will be allowed to write at the annual examinations who has not paid all fees and dues for which he is liable.

The minimum percentage of marks required to pass in the written examination will be fixed from time to time by the Council.

The minimum percentage of marks required to pass in the practical work connected with any subject shall be one and one-half times the minimum required in the case of a written examination.

In order to pass the practical examinations in the subjects of applied mechanics, descriptive geometry, electrical design, optics, surveying and architecture, the drawings set in these subjects must be made.

*20 - 21*

### Term Examinations.

Term examinations may be held in any subject and at any time at the discretion of the instructor or by order of the Council, and the results of such examination may, if the Council so decides, be incorporated with those of the annual examinations in the same subjects.

### Supplemental Examinations.

A candidate who fails in one or two subjects at the Annual Examinations will be required to take supplemental examinations in such subjects.

The supplemental written examinations will begin on the 24th of September, 1920. Candidates are required to send to the Secretary of the Faculty not later than the 15th of September, notice in writing of their intention to take such examinations, and to remit to the Bursar the fee of \$10.00. A penalty of \$1.00 will be imposed upon all candidates who fail to give notice within the time stated.

In the case where a candidate fails to pass a supplemental examination it will count as one of the two supplemental examinations which may be allowed him after the next annual examination.

### Vacation Work.

Vacation work must be handed in on or before the first day of the session.

Vacation notes must be on construction only, except in Department 2 (see p. 73), and contain not less than twenty, nor more than thirty pages of sketches. These sketches must be freehand pencil drawings with figured dimensions.

Notes must be made in standard note books approved of by the Faculty. Notes which have been taken during the session in connection with the work in drawing will not count as vacation work.

The minimum percentage of marks required for practical work must be made in the case of vacation notes.

### **Shop Work.**

Students in Mechanical and Electrical Engineering are not considered as having completed their course of study, nor are degrees granted until certificates have been submitted to the Council, and accepted as satisfactory, showing not less than eight months of mechanical experience in production of some kind under commercial conditions. Preferably the work undertaken should be in one of the manufacturing industries or trades with which the Course is related.

It is not desirable that any student in these Courses should enter sales or other non-production departments of the engineering industries without having acquired some personal experience in mechanical production. It is best to obtain this experience under commercial conditions. Otherwise one can not at all appreciate shop conditions and limitations.

### **Honours.**

Honours will be granted in each department to the students who obtain at least 40 per cent. in each subject, and 66 per cent. of the total number of marks allotted to the department at the annual examinations.

Honour Graduate standing will be granted to those who obtain honours in the final and in one previous year.

### **REGULATIONS RESPECTING TERM WORK.**

Students working in any laboratory must be governed by the regulations relating thereto as made known from time to time.

No laboratory reports or drawings may be removed from the laboratories without permission. The Council reserves the right to dispose of them as may be thought proper.

### **Field Work.**

Field Work in Surveying of the First and Second Years will be taken on the University grounds, during the session.

The Field Work of the Third Year, for the session 1920-1921, will be taken previous to the session, during the months of August and September, 1920, on a tract of land lately purchased by the University, situated on the shore of the Gull Lake, and about five miles from the Village of Minden, and being Lot No. 9 in the 13th Concession of the Township of Lutterworth. The camp may be reached by taking the train leaving Lindsay for Haliburton, and getting off at Gelert.

Students of the Third Year, Department 1, are expected to reach Gelert in the afternoon of August 21st, and those of Department 2, on September 2nd, when conveyances will meet them to take them to the camp. Personal effects must be limited to sixty pounds in weight, which must include two pairs of blankets, or their equivalent; beds and mattresses only will be provided.

No field notes will be counted which have not been taken in the field and during the hours allotted to such work.

Students taking practical astronomy are required to take observations in the field for time, latitude, and azimuth.

#### Drafting Rooms.

Drawings and briefs for same, that are required to be finished the first term of the session will not be counted unless finished in that term.

The minimum number of drawings in first and second years shall be twenty-five, and the maximum number thirty-five.

No drawings or briefs for same will be counted which have not been made in the drafting rooms, and during the hours allotted to such work.

#### Theses.

In the Fourth Year each student is required to prepare a thesis on a subject approved by the Council. The title of the thesis must be sent to the Secretary of the Faculty for approval on or before November 1st, and the completed thesis must be handed in not later than the first day of the second term and shall become the property of the University. The rules governing size, form, etc., may be obtained on application to the Secretary.

#### EXEMPTIONS.

Applications for exemption from any of the regulations must be made to the Council in writing and the particulars of the case fully stated.

#### COURSES OF INSTRUCTION.

On the following pages the courses of instruction in the various departments are set forth in detail. The time devoted to the various subjects, both for lectures and practical work, is indicated as accurately as possible but is subject to modifications from time to time as occasion seems to require. In the First Year the course is common to all departments except Architecture and Chemical Engineering (courses 4 and 6). In the Second Year the courses in Mechanical and Electrical Engineering (courses 3 and 7) are identical.

**1. DEPARTMENT OF CIVIL ENGINEERING.**

The courses of study in Civil Engineering are designed to give the student a sound training in the fundamental scientific principles on which the practice of the profession is based. The instruction is given by means of lectures and practical work in the field, the drafting room and the laboratory. In this way the student is led to apply the principles developed in the classroom.

**Civil Engineering—First Year.**

Subject	No.	Hours per week.			
		First Term.		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Algebra.....	187	2			2
Plane Trigonometry.....	189	2			
Analytical Geometry.....	188	1			2
Descriptive Geometry.....	115	1			1
Surveying.....	205, 206	1	5	1	
Statics.....	10	2			2
Dynamics.....	11	2			2
Elementary Chemistry.....	75	2			2
Electricity.....	135	2			2
Engineering Problems.....	193	1			1
Drawing.....	117		11		20

**Second Year.**

Vacation Work.....	220				
Calculus.....	190	2			2
Spherical Trigonometry.....	191	1			
Elementary Astronomy.....	55	1			1
Descriptive Geometry.....	121	1			1
Surveying.....	207, 208	1	9	1	
Dynamics.....	12	1			1
Strength of Materials.....	13	2			2
Optics.....	197	1	1½	1	1½
Hydrostatics.....	196			1	1
Engineering Chemistry.....	85			1	
Organic Chemistry.....	87	1			
Mineralogy.....	159, 161	2	1		2
Metallurgy.....	183			1	
Finance.....	66			1	
Drawing.....	123		6		12
Chemical Laboratory.....	81		3		3

**Third Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Least Squares.....	192			1	
Practical Astronomy and Geodesy.....	56, 57	2		2	
Surveying and Levelling....	209, 210	1		1	
Descriptive Geometry.....	127	1			
Hydraulics.....	29, 30	2		2	3
Photography.....	199	1	1½		1½
Ferro-Metallurgy.....	181	1		1	
Theory of Structures.....	18	2		2	
Cements and Concrete.....	21			1	
Engineering Chemistry.....	94	1		1	
Geology.....	150	1		1	
Commercial Law .....	67	1		1	
Heat.....	198	1	1½		
Strength of Materials.....	14		3		
Drawing.....	128		8		18

**Fourth Year.**

†Foundations.....	20	1	1	1	1
Electricity.....	440	1			
†Thermodynamics.....	34, 39a	1		1	2
Economic Geology.....	151	1		1	
Contracts and Specifications	68			1	
Thesis.....	219				
And one of					
(a) {Astronomy.....	58, 59	2	23	2	23
{Geodesy.....	60	2		2	
(b) {Sanitary Engineer- ing.....	213	1½	16	1½	16
{Highway Engineer- ing.....	214	1	6	1	6
(c) Structural Engineer- ing.....	215	6		7	
Strength of Materials					
Laboratory.....			5		6
Structural Design					
Drawing.....	133		17		16
(d) Strength of Materials	16, 17, 22, 22	3½		3½	

† Not required of those taking the Astronomy option.

**Fourth Year (Continued).**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y
Strength of Materials					
Laboratory .....			5		6
Structural Design					
Drawing .....	133a		6		5
with either :					
(1) Hydraulics.....	31, 31a, 32	3	10	3	10
or					
(2) Railway Engineering.	211, 212	2	11	2	11

**2. DEPARTMENT OF MINING ENGINEERING.**

The course in Mining Engineering is intended to serve as a preliminary training for those who expect to practise the art of mining or metallurgy. In the second year it differs very little from the course in civil engineering, in the third year some subjects peculiar to mining and metallurgy are taken up.

In general this course is designed to first give the student a good training in the parts of engineering essential to all branches, such as surveying, drafting, etc., and then in the upper years to allow him to follow studies peculiar to mining engineering.

Candidates for the degree in this department will be required to present satisfactory evidence of having had at least six months' practical experience in work connected with mining, metallurgy or geology, for which they must have received regular wages. Certificate forms, giving full details as to acceptable classes of work, will be furnished on application, and should be obtained by all students before entering employment.

**First Year.**

(Same as for Civil Engineering.)

**Second Year.**

Subject	No.	Hours per week.			
		First Term. Lect.	Second Term. Lab'y.	First Term. Lect.	Second Term. Lab'y.
Vacation Work.....	220				
Calculus.....	190	2			2
Descriptive Geometry.....	121	1			1
Surveying.....	207, 208	1	9		1
Dynamics.....	12	1			1
Strength of Materials.....	13	2			2
Optics.....	197	1	1½	1	1½
Hydrostatics.....	196			1	1
Inorganic Chemistry.....	79	1			
Organic Chemistry.....	87	1			
Engineering Chemistry.....	85				1
Mineralogy.....	157, 160	2	1		3
Geology.....	150	1		1	
Mining.....	170, 171	1	3		
Metallurgy.....	183			1	
Finance.....	66			1	
Drawing.....	123		3		12
Chemical Laboratory.....	81, 82		6		6

**Mining Engineering—Third Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Surveying and Levelling.....	209, 210	1			
Theory of Structures.....	19	2			
Engineering Chemistry.....	94	1		1	
Analytical Chemistry.....	80	1		1	3
Assaying.....	173	1	3		
Petrography.....	163	1		1	
Mineralogical Laboratory...	164		2		2
Economic Geology.....	151, 156	1		2	2
Ore Deposits.....	155	1		1	
Mining.....	172			2	3
Hydraulics.....	29	2		2	
Ore Dressing.....	177	1		1	
Ferro-Metallurgy.....	181	1		1	
Metallurgy.....	184	1		1	
Commercial Law .....	67	1		1	
Drawing.....	129		7		2
Chemical Laboratory.....	93				11

**Fourth Year.**

Thermodynamics.....	34	1		1	
Electrochemistry.....	101	2			
Assaying.....	174			1	3
Petrography.....	165, 166	1	2	1	2
Geology, Archaean and Glacial.....	152, 154	2	1	2	
Geology, Mining.....	153	1		1	
Mining.....	175	1		1	
Ore Dressing.....	179	1		1	
Metallurgy.....	180, 182	1		1	
Mine and Plant Manage- ment.....	70	1		1	5
Milling.....	176				5
Power.....	32a, 39a, 141		3		2
Design.....	215		3		3
Chemical Laboratory.....	112		10		
Thesis.....	219		6		2

### 3. DEPARTMENT OF MECHANICAL ENGINEERING.

The course in this Department is designed to meet the needs of those students who are intending to take up the work connected with Mechanical Engineering, such as the design of gas engines, steam engines, steam boilers, steam turbines, air compressors, etc.; the design and installation of the machinery connected with power plants and central stations, steam piping and other similar problems. The work is also so arranged that the student becomes somewhat familiar with the design of travelling cranes and mill buildings and similar problems connected with structural steel work.

Since the work of the mechanical engineer and of the electrical engineer is closely allied, the courses in these two departments in the first two years are identical and cover the subjects mentioned below.

In the third year the work becomes more specialized, the mechanical engineers paying more attention to heat engines of various types, and to mill building design and other work of similar nature. The study of electricity is continued and the student gets considerable practice in the mechanical and electrical laboratories.

In the fourth year the student devotes himself still more closely to his chosen work, placing the greater stress on thermodynamics and the theory and testing of heat engines, and problems in machine design. Much time is spent in the mechanical laboratories testing gas and steam engines and other machines.

Before receiving the degree in this department candidates are required to present satisfactory evidence of having had at least eight months' practical experience in one of the principal trades connected with Mechanical Engineering, the object being that graduates may have some practical knowledge of the duties of the workman in this branch of engineering, as distinguished from those of the purely technical man. Certificate forms will be furnished on application. These forms contain full details in regard to the work required and should be obtained by the candidate before he enters his employment.

**Mechanical Engineering—First Year.***(Same as for Civil Engineering.)***Second Year.**

Subject	No.	Hours per week			
		First Term Lect.	Second Term Lab'y.	First Term Lect.	Second Term Lab'y.
Vacation Work.....	220				
Calculus.....	190	2			2
Descriptive Geometry.....	121	1			1
Dynamics.....	12	1			1
Theory of Mechanism.....	25	2			2
Steam Engines.....	38				1
Strength of Materials.....	13	2			2
Optics.....	197	1		1½	1
Hydrostatics.....	196				1½
Electricity.....	138, 139	2		3	2
Engineering Chemistry.....	85				1
Organic Chemistry.....	87		1		
Finance.....	66				1
Drawing.....	124			14	10
Chemical Laboratory.....	81		3		3
Machine Tools.....	28a				1

**Third Year.**

Subject	No.	Hours per week			
		First Term	Second Term	Lect.	Lab'y.
Mechanics of Machinery....	26	1		1	
Machine Design.....	27	2	7	2	7
Thermodynamics.....	33, 35	2	2	2	2
Heat Engines.....	39	1		1	
Hydraulics.....	29, 30	2		2	1
Theory of Structures.....	19	2			
Ferro-Metallurgy.....	181	1		1	
Magnetism and Electricity.	144, 142	2	4½	2	4½
Alternating Current.....	143	1		1	
Engineering Chemistry.....	94	1		1	
Commercial Law.....	67	1		1	
Strength of Materials.....	14		2		
Drawing.....	132		8		2

**Fourth Year.**

Mill Building Design.....	24a, 134		3	1	3
Shop Management and Costs	69	1		1	
Machine Design.....	28	1	4	1	4
Thesis.....	219				
And two of					
(d) Hydraulics.....	31, 31a, 32	3	9	3	9
(e) Strength of Materials	16, 17, 22, 23	3½		3½	
Strength of Mater-					
ials Laboratory...		6		4	
Structural Design Drawing.	134a	4		6	
(g) Thermodynamics....	36, 36a, 37	3	10	3	10

#### 4. DEPARTMENT OF ARCHITECTURE

The instruction in this department is arranged to lay a broad foundation for the subsequent professional life of its graduates, and incidentally to prepare its students to be immediately useful in an architect's office. The curriculum has been arranged to meet the aesthetic and scientific needs of the profession, and includes History and Principles of Architecture, Free-hand Drawing in pencil, ink and color, Modelling, Architectural Design, Analysis and Criticism of Buildings, Mathematics, Statics, Strength and Elasticity of Materials, Theory of Construction and Heating and Ventilation.

The equipment of the department includes a working library, a large file of periodicals, photographs, lantern slides, and a large collection of models and casts.

#### SUBJECTS OF INSTRUCTION.

##### First Year.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Analytical Geometry.....	188	1		2	
Descriptive Geometry.....	116	1		1	
Building Measurement.....	52	1	9	1	
Statics.....	10	2		2	
Elementary Chemistry .....	75	2		2	
Elements of Architecture...	45	1		1	
History and Principles of Architecture.....	40	1	3	1	
French.....	217	2		2	
Drawing.....	118		9		18
Freehand Drawing.....	49		3		2
Modelling.....	50		2		2

##### Second Year

Vacation Work.....	220				
Calculus.....	190	2		2	
Descriptive Geometry.....	122	1		1	
Strength of Materials.....	13	2		2	
Illumination.....	200	1	1½	1	1½
Architectural Design.....	46	1		1	
History of Architecture....	41	1		1	

**Second Year—Continued.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
History of Ornament.....	43	1			1
French.....	217	1			1
Finance.....	66				1
Drawing					
Architectural Design }.....	125		17		17
Freehand Drawing...}	49a		3		3
Modelling.....	50a		2		2

**Third Year.**

Descriptive Geometry.....	131				
Acoustics.....	195	1	1½	1	
History of Architecture....	42	1		1	
History of Painting and Sculpture.....	44	1		1	
Architectural Design.....	47	1		1	
Building Materials.....	53	2		2	
Theory of Structures.....	19	2			
Cements and Concrete.....	21			1	
Commercial Law.....	67	1		1	
Strength of Materials.....	14				2
Photography.....	199	1	1½		1½
Modelling.....	50b		2		2
Water Color Painting.....	49b		3		3
Drawing }.....	130		7		
Architectural Design }.....			6		22

**Fourth Year.**

Strength of Materials.....	22	1		1	6
Structural Design.....	24	1	1	1	1
Electricity.....	140	1		1	
Heating and Ventilating....	54a	1		1	
Sanitary Science.....	54	1		1	
Contracts and Specifications	68			1	
Thesis.....	219		3		3
Drawing from life.....	49c		3		3
Modelling from life.....	50c		2		2
And one of					
(l) Architectural Design.	48	2	17	2	17
(m) Architectural Engi- neering.....	216	4	19	3	23

**5. DEPARTMENT OF ANALYTICAL AND APPLIED CHEMISTRY.**

The course in Analytical and Applied Chemistry is designed to furnish instruction suitable for those students who intend to practise chemistry as a profession, either as analysts or as works chemists.

(No new students are being accepted for this course, and in 1921 it will cease to exist.)

**SUBJECTS OF INSTRUCTION.****Fourth Year.**

Subject	No.	Hours per week.			
		First Term.		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Inorganic Chemistry.....	103	1	3	2	
Organic Chemistry.....	104	1	15	1	
Shop Management and Costs.....	69	1		1	
German.....	218	1		1	
Thesis.....	219				
And one of					
(h) Electrochemistry.....	108, 109	2	11	2	29
(i) Industrial Chemistry.....	106, 107	1	12	1	30
(j) Sanitary and Forensic Chemistry and Bacteriology.....	64, 110, 111	1	12	2	29
(k) Metallurgy.....	180	2	11	1	30

**6. DEPARTMENT OF CHEMICAL ENGINEERING.**

In many industries there is a demand for a man who combines the technical knowledge of the mechanical engineer with a knowledge of chemistry. It is to fill this want that the course in Chemical Engineering is designed.

**First Year.**

Subject	No.	Hours per week.			
		First Term.		Second Term.	
		Lect.	Lab'y.	Lect.	Lab'y.
Algebra.....	187	2		2	
Plane Trigonometry.....	189	2			
Analytical Geometry.....	188	1		2	
Descriptive Geometry.....	115	1		1	
Statics.....	10	2		2	
Dynamics.....	11	2		2	
Elementary Chemistry.....	75	2		2	
Mineralogy Laboratory.....	158				3
Electricity.....	135	2		2	
Biological Laboratory.....	62	3		3	
Engineering Problems.....	193	1		1	
Drawing.....	119		4		4
Chemical Laboratory.....	78		10		10
German.....	218	1		1	

**Second Year.**

Vacation Work.....	220				
Calculus.....	190	2		2	
Strength of Materials.....	13	2		2	
Electricity.....	138, 139	2	3	2	3
Engineering Chemistry.....	85			1	
Industrial Chemistry.....	86	1		1	
Organic Chemistry.....	88	2		2	
Physical Chemistry.....	90	2		2	
Inorganic Chemistry.....	79	1			
Optics.....	197	1	1½	1	1½
Hydrostatics.....	196			1	1
German.....	218	1		1	
Finance.....	66			1	
Drawing.....	126		7		3
Chemical Laboratory.....	84		12		10
Metallurgy.....	183			1	
Machine Tools.....	28a			1	

**Third Year.**

Subject	No.	Hours per week.			
		First Term		Second Term.	
		Lect.	Lab'y.	Lect.	Lab'y.
Theory of Structures.....	19	2			
Thermodynamics.....	33, 35	2	2	2	1½
Electrochemistry.....	101, 102	2	3		
Engineering Chemistry.....	94	1		1	
Organic Chemistry A.....	97	2		2	
Organic Chemistry B.....	98			1	
Industrial Chemistry.....	95	1		1	
Analytical Chemistry.....	80	1		1	
Metallurgy.....	184	1		1	
Ferro-Metallurgy.....	181	1		1	
Chemical Plant.....	96	1		1	
Hydraulics.....	29, 30	2		2	1
Commercial Law.....	67	1		1	
German.....	218	1		1	
Assaying.....	173				3
Drawing.....	132		3		3
Chemical Laboratory.....	92		8		11

**Fourth Year.**

Machine Design.....	27	2	3	2	-
Inorganic Chemistry.....	103	1	3	2	
Organic Chemistry.....	104	1	13	1	
Shop Management and Costs.....	69	1		1	
Power.....	32a, 141		2		2
German.....	218	1		1	
Thesis.....	219				
And one of					
(h) Electrochemistry.....	108	2	9	2	24
(i) Industrial Chemistry.....	106, 107	1	10	1	25
(j) Sanitary and Forensic Chemistry and Bacteriology.....	64, 110, 112	1	10	2	24
(k) Metallurgy.....	180	1	10	1	25

## 7. DEPARTMENT OF ELECTRICAL ENGINEERING.

The course in Electrical Engineering is arranged to provide preliminary training for those who would follow any of the various lines of activity connected with electrical industry.

The first two years of the course are devoted to fundamental scientific principles, and incidentally more or less of their application to engineering problems in mechanical, civil and electrical work. Many problems are solved in the drafting rooms by graphical methods. The third year includes further theoretical work, more particular attention being given to electrical and mechanical studies in theory, operation and design. The fourth year is devoted to advanced work in alternating current theory and practice combined with similar study in thermodynamics, hydraulics or electrochemistry.

A large amount of laboratory practice is provided, most of which belongs to the third and fourth years. In this last year most of the time is spent in laboratory investigations and studies resulting therefrom.

Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in one of the principal trades connected with Electrical Engineering, the object being that graduates may have some practical knowledge of the technique of this branch of engineering. Certificate forms will be furnished on application. These forms contain full details in regard to the work required.

### First Year.

(*Same as for Civil Engineering.*)

## Second Year.

Subject.	No.	Hours per week.			
		First Term.		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Vacation Work.....	220				
Calculus.....	190	2		2	
Descriptive Geometry.....	121	1		1	
Optics.....	197	1	1½	1	1½
Hydrostatics.....	196			1	1
Dynamics.....	12	1		1	
Strength of Materials.....	13	2		2	
Theory of Mechanism.....	25	2		2	
Steam Engines.....	38			1	
Electricity.....	138,139	2	3	2	3
Engineering Chemistry.....	85			1	
Organic Chemistry.....	87	1			
Finance.....	66			1	
Drawing.....	124		12		12
Chemical Laboratory.....	81		3		3
Machine Tools.....	28a			1	

## Third Year.

Mechanics of Machinery....	26	1		1	
Machine Design.....	27	2	4½	2	4½
Hydraulics.....	29,30	2		2	1
Thermodynamics.....	33,35	2	2	2	1½
Heat Engines.....	39	1		1	
Electrochemistry.....	101,102	2	3		
Magnetism and Electricity..	142	2		2	
Alternating Current.....	143	1		1	
Electrical Design.....	145	1	3	1	3
Electrical Laboratory.....	144		6		6
Engineering Chemistry.....	94	1		1	
Ferro-Metallurgy.....	181	1		1	
Commercial Law.....	67	1		1	3

## Fourth Year.

Applied Electricity.....	146,147	3	20	3	20
Shop Management and Costs.....	69	1		1	
Thesis.....	219				
And one of:					
(d) Hydraulics.....	31, 31a, 32	3	9	3	9
(g) Thermodynamics.....	36, 36a, 37	3	9	3	9
(h) Electrochemistry.....	108, 109	2	9	2	9

**8. DEPARTMENT OF METALLURGICAL ENGINEERING.**

The object of this course is to provide instruction and preliminary training for those who intend to become metallurgical engineers. Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in metallurgical work.

**First Year.**

(Same as for Civil Engineering.)

**Second Year.**

Subject	No.	Hours per week.			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Calculus .....	190	2		2	
Descriptive Geometry.....	121	1		1	
Dynamics.....	12	1		1	
Strength of Materials.....	13	2		2	
Hydrostatics.....	196			1	1½
Steam Engines.....	38			1	
Inorganic Chemistry.....	79	1			
Physical Chemistry.....	90	2		2	
Finance.....	66			1	
Chemical Laboratory.....	83		14		9
Mineralogy.....	169		1		1
Mining.....	170, 171	1	3	1	
Metallurgy.....	183, 185	1		2	
Spanish.....	218a	1		1	
Drawing.....	121		7		3
Engineering Chemistry....	85			1	

**Third Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Theory of Mechanism.....		25	2		2
Theory of Structures.....		19	2		
Commercial Law.....		67	1		1
Analytical Chemistry.....		80	1		1
Electrochemistry.....	101, 102	2		3	
Ferro-Metallurgy.....	181	1			1
Cement and Concrete.....	21				1
Assaying.....	173	1	2		2
Metallurgy.....	186	1	2	4	6
Mining.....	172			2	3
Ore Dressing.....	177	1		1	
Heat.....	198	1	1½		
Chemical Laboratory.....	93		5		10
Drawing.....	132		3		

**Fourth Year.**

Thermodynamics.....		34	1		1
Heat Engines.....		39	1		1
Ore Dressing.....			2	2	4
Assaying.....	174			1	3
Mine and Plant Management .....		70	1		1
Plant Design.....	186b	2		2	
Power.....	32a, 39a, 141			3	3
Metallurgy.....	186a	2	8	2	8
Thesis.....	219		6		6

**OUTLINE OF COURSES OF INSTRUCTION.****APPLIED MECHANICS.****10. STATICS:—*T. R. Loudon.***

Departments 1, 2, 3, 4, 6, 7 and 8, I Year; 2 hours per week; both terms.

This course of lectures deals with forces in a single plane, and concerns chiefly the calculation of tension, compression and shearing stresses in frame structures and solid beams. It also deals with the consideration of problems relating to friction.

**11. DYNAMICS:—*J. McGowan.***

Departments 1, 2, 3, 6, 7 and 8, I Year; 2 hours per week; both terms.

This course of lectures deals with bodies having motion of translation in one plane; also with relative motion, momentum, work and energy.

Text book:—Tutorial Dynamics—Briggs and Bryan.

**12. DYNAMICS OF ROTATION:—*W. J. Loudon.***

Departments 1, 2, 3, 7 and 8, II Year; 1 hour per week; both terms.

This course covers angular motion, including moments of inertia, simple harmonic motion, the pendulum, centres of mass, suspension and percussion, the simple theory of the fly-wheel and the governor.

Text book:—Dynamics of Rotation—Worthington.

**13. STRENGTH OF MATERIALS:—*P. Gillespie, C. R. Young.***

Departments 1, 2, 3, 4, 6, 7 and 8, II Year; 2 hours per week; both terms.

In this course the strength and elasticity of materials are mathematically treated. The stresses in such elements of structures as the tie rod, the beam, the strut and the member subjected to shear are investigated and the elementary principles of design established. In the lecture and drafting rooms through numerous problems involving the design of simple beams, columns, riveted connections, etc., these principles are exemplified. The work includes also the discussion of eccentric loading, suddenly applied loads and repeated stresses.

Reference Book:—Mechanics of Materials—Merriman.

14. STRENGTH AND ELASTICITY OF MATERIALS:—*J. McGowan.*

Departments 1, 3 and 4, III Year; 3 hours per week; one term.

This course is intended to give the student an introduction to the experimental study of the strength and elasticity of materials. It is intended that he shall acquire some familiarity with the construction and operation of testing machines and with the properties of the ordinary building materials.

Reference Book:—Laboratory Instructions, Department of Applied Mechanics, U. of T., 1913.

16. THEORY OF STRUCTURES:—*J. McGowan.*

Departments 1 and 3, IV Year; 2 hours per week; both terms.

The work taken up in this course of lectures consists in swing bridges, arches, suspension bridges and some special features in column construction.

Reference Books:—Modern Framed Structures—Johnson. Typical Steel Railway Bridges—Thomson.

17. STRENGTH AND ELASTICITY OF MATERIALS:—*P. Gillespie.*

Departments 1, 3 and 4, IV Year; a laboratory course of about 11 hours per week.

This course of experiments is intended to give the student practice in investigating the elastic and physical properties of iron, steel, concrete, timber and other building materials.

Reference book:—Materials of Construction—Johnson.

18. THEORY OF STRUCTURES:—*C. R. Young.*

Department 1, III Year; 2 hours per week; both terms.

The work of the first term comprises a thorough discussion of combined stresses, restrained, continuous and trussed beams, multiple beam and box girders, plate girders and certain practical aspects of column design. A number of designs of girders and structural details are worked out in the class and drafting rooms.

The second term is given chiefly to the design of a riveted truss highway span and a riveted truss railway span, the complete designs being made in the lecture and drafting rooms.

19. THEORY OF STRUCTURES:—*C. R. Young.*

Departments 2, 3, 4, 6 and 8, III Year; 2 hours per week; first term.

The work is the same as that for Department 1 in the first term.

Text books:—Modern Framed Structures, Part III—Johnson, Bryan and Turneaure; Aids in Structural Design—Young; Carnegie Pocket Companion; Cambria Steel.

20. FOUNDATIONS, RETAINING WALLS AND DAMS:—*P. Gillespie, W. J. Smith.*

Department 1, IV Year; 1 hour per week; both terms.

This course of lectures is devoted to the design of the structures mentioned. Preparatory to the discussion of the practical aspects of the subjects, and in order to gain familiarity with the fundamental principles involved, a part of the first term is given over to the consideration of the theory of compound stress. The most approved forms of construction of retaining walls, footings, abutments, piers and dams are then described, and typical designs are worked out in the class and drafting rooms.

Text books and books of reference:—Retaining Walls for Earth—M. A. Howe; Walls, Bins and Grain Elevators—M. S. Ketchum; A Treatise on Masonry Construction—I. O. Baker; Design and Construction of Dams—E. Wegmann.

21. CEMENTS AND CONCRETE:—*P. Gillespie.*

Departments 1, 4 and 8, III Year; 1 hour per week; second term.

The manufacture, testing and use of Portland cement and the fundamentals of the theory of reinforced concrete are discussed in this course of lectures.

22. REINFORCED CONCRETE:—*P. Gillespie, W. J. Smith.*

Departments 1, 3 and 4, IV Year; 1 hour per week.

The theory of the strength of reinforced concrete elements including the beam, the slab, the T-beam and the column, is continued in this course.

The analysis of the monolithic arch by the elastic theory is discussed, and the student is required in the drafting room to apply his knowledge to the design of simple structures.

Reference books:—Principles of Reinforced Concrete Construction—Turneaure and Maurer; Reinforced Concrete Construction, Vol. I—Hool.

23. IRON AND STEEL:—*T. R. Loudon.*

Taken by students in IV Year, who select the options (c) Structural Engineering, and (e) Strength and Elasticity of Materials.

Metallography—Mechanical Treatment, Heat Treatment; Metallurgy; Physical Properties; 1 lecture per week. Laboratory, second term.

24. STRUCTURAL DESIGN:—*C. R. Young, W. J. Smith.*

Departments 1 (*Structural Engineering Option*) and 4, IV Year; 1 hour per week; both terms. Department 3, 1 hour per week; first term.

This course of lectures is devoted to the problems connected with the structural design of buildings of timber, steel and reinforced concrete. The various structural elements, such as the floors, columns, footings, walls and wind bracing, are fully discussed, and portions of typical buildings are designed in the class and drafting rooms.

**Text books:**—Architectural Engineering—Freitag; Steel Construction—Tucker; Structural Details—Jacoby; Architects' and Builders' Pocket Book—Kidder.

**24a. MILL BUILDING DESIGN:**—*C. R. Young, W. J. Smither.*

Departments 1 (*Structural Engineering Option*), 3 and 4 (*Architectural Engineering Option*), IV Year; 1 hour per week; second term.

Consideration is given in this course to the various types of mill buildings, to the conditions governing their choice and the details of construction in different materials. Designs of portions of mill buildings are worked out in the class and drafting rooms.

**Text books:**—Mill Buildings—Tyrrell; Steel Mill Buildings—Ketchum.

**24b. MISCELLANEOUS STRUCTURES:**—*C. R. Young, W. J. Smither.*

Department 1 (*Structural Engineering Option* and *Sanitary and Highway Engineering Option*), IV Year; 1 hour per week, second term.

In this course of lectures the application of theoretical principles to the design of a variety of structures is made. Among those structures discussed are transmission line towers, elevated tanks and their supporting towers, standpipes, large pressure pipes, sewers, culverts, small highway bridges, sub-surface tanks and tall chimneys. Whenever possible the lecture work is followed up by designs in the drafting rooms.

### MACHINERY.

**25. THEORY OF MECHANISM:**—*J. H. Parkin.*

Departments 3 and 7, II Year; Department 8, III Year; 2 hours per week; both terms.

This course of lectures treats of the motions of machines, the latter being assumed to be of sufficient strength to resist acting forces. The formation of machines is dealt with in a general way and the efficiency of machines considered. Investigations of the velocities of points and links are made. The design of gear teeth and the application of trains of gears are taken up, also problems in static equilibrium.

Problems are worked out in the drafting room in which the methods given are employed.

**Text book:**—Theory of Machines—Angus.

**26. MECHANICS OF MACHINERY:**—*J. H. Parkin.*

Departments 3 and 7, III Year; 1 hour per week; both terms.

In this course the questions dealt with are the construction of acceleration diagrams, the determination of the accelerations of various parts of machines, the kinetic energy of machines, the effect of the weights and accelerations of parts on the velocity of the fly-wheel and the proper weight of the latter to fulfil given conditions. The theory of various forms of governors is fully taken up and also the efficiency of machines.

**Text book:**—Theory of Machines—Angus.

27. MACHINE DESIGN—*J. H. Parkin.*

Departments 3 and 7, III Year; lectures, 2 hours per week; both terms.

Department 6, III Year; first term only.

The design work occupies 7 hours per week for Department 3,  $4\frac{1}{2}$  hours for Department 6 and  $4\frac{1}{2}$  hours for Department 7.

Using the previous work in mechanics and kinematics as a groundwork, the lectures in this course deal with the design of shafting, journal bearings, gearing, flywheels, belting, springs, clutches, ball and roller bearings, machine supports, framing, etc.

The problems worked out in the design room are planned to include the principal parts of some complete machine such as an engine or machine tool.

28. ADVANCED MACHINE DESIGN—*J. H. Parkin.*

Department 3, IV Year; lectures, 1 hour per week; design, 4 hours per week; both terms.

The work of this course gives practice in the design of complete machines from specifications, having regard for durability, safety, cost of materials, and difficulties in casting, machining and assembling. Mechanisms are developed to give required motions and control.

The lectures deal also with compound stress, helical gearing and questions of vibration and stability. Machine tools, automatics and process machinery are discussed as far as time will allow.

28a. MACHINE TOOLS—*J. H. Parkin.*

Departments 3, 6 and 7, II Year; 1 hour per week; second term.

A course of lectures dealing with the construction and operation of machine tools and some classes of process machinery. The object of the course is to familiarize the student with the principles of metal removal and acquaint him with a few typical machine tools.

## HYDRAULICS.

29. HYDRAULICS:—*J. J. Traill.*

Departments 1, 2, 3, 6, 7 and 8, III Year; Department 6, IV Year; 2 hours per week.

This is an introductory course of lectures in hydraulics, and is devoted to the development and discussion of fundamental formulas relating to the flow of water in pipes, the measurement of discharge by various methods, such as orifices and weirs, the conditions of flow obtaining in open channels, artificial and natural, and in pipes flowing partially full, together with other kindred subjects.

The object of this course is to provide the student with a good working knowledge of the fundamental principle of hydraulics, such as is useful in practical work, and is necessary to the intelligent investigation of more advanced problems, such as the design of water supply, sewerage and irrigation system, and water power plants.

**30. HYDRAULIC LABORATORY:**—*R. W. Angus, J. J. Traill.*

Department 1, III Year; 3 hours per week; one term. Departments 3 6, and 7, III Year; 4 periods of 3 hours each.

The work in this course is intended to illustrate the lecture course given in Hydraulics and to give the student some working acquaintance with the formulas met with in practice. Experiments are made to determine the coefficients for an orifice and the coefficients of discharge for a weir. The results of these experiments are used in measuring the discharge in subsequent experiments on meters and for the determination of hydraulic resistances in various cases of flow in pipes.

**31. HYDRAULICS:**—*J. J. Traill.*

Departments 1, 3 and 7, IV Year; 1 hour per week; both terms.

A study of the collection and application of stream flow data is followed by an investigation of precipitation and evaporation and their relation to run-off. Flow in pipes is taken up special attention being paid to exponential formulas, flow in branched pipes, water-hammer and measurement of flow. Flow over weirs and in open channels is also studied.

**31a. HYDRAULICS:**—*R. W. Angus.*

Departments 1, 3, 6 and 7, IV Year; 2 hours per week, both terms.

The most important question considered and to which most of the lectures are devoted is the theory of turbines and centrifugal pumps, the effect of the design on the speed, discharge power and efficiency being fully taken up.

Text books:—Centrifugal Pumps—Loewenstein and Crissey; Hydraulics—Merriman; Water Power Engineering—Mead.

**32. HYDRAULICS:**—*R. W. Angus, J. J. Traill.*

Departments 1, 3 and 7, IV Year; about 10 hours per week.

A laboratory course devoted to experimental work on turbines of various types and centrifugal and turbine pumps and other similar devices. This experimental work is arranged to illustrate the lectures on turbine and pump design. The experiments are made

on two large turbine pumps used in the laboratory supply, as well as on apparatus specially designed for instruction. Various methods of measuring water-power and the efficiency of machines are also given.

**32a. POWER:**—*J. J. Traill.*

Departments 2 and 8, IV Year; 24 hours.

A laboratory course of experiments on orifices, weirs, turbines, meters, and pumps,

**32b. HYDRAULICS:**—*J. J. Traill.*

Department 1, IV Year.

This is a lecture course of two hours per week, first term, dealing with those features of stream flow, precipitation and evaporation that have special application to water supply and sewerage systems. A study of pipes, weirs and pumps is also made.

**32c. HYDRAULICS:**—*J. J. Traill.*

Department 1, IV Year.

A laboratory course of four hours per week, first term, on measurement of water, flow in open channels and pumps.

## HEAT ENGINES.

**33. THERMODYNAMICS:**—*R. W. Angus.*

Departments 3, 6 and 7, III Year; 2 hours per week.

A lecture course in which the subject is treated in such a way as to make it of practical value and give a working acquaintance with the principles on which it is based. After the elementary ideas have been given and the proofs of the properties of Carnot's cycle, applications of the subject are made to the perfect gas and to saturated steam and to the various types of engines. Temperatures are taken from the air thermometer.

**34. THERMODYNAMICS:**—*R. W. Angus.*

Departments 1, 2 and 8, IV Year; 1 hour per week; both terms.

This course is especially designed to give the student a working knowledge of thermodynamics as applied to the perfect gas and steam so that he will be able to understand clearly the action of air compressors, steam engines, etc. After deducing general principles, the efficiency of compressed air transmission and the relative merits of different types of compressors are discussed. The steam engine and boiler are also discussed.

**35. THERMODYNAMICS AND MECHANICAL LABORATORY:**—*L. M. Arkley.*

Department 3, III Year; 2 hours per week, first term; 3 hours per week, second term. Departments 6 and 7, III Year; 2 hours per week, first term; 1½ hours per week, second term.

This laboratory course is designed to assist in a clearer understanding of thermodynamics, machine design and mechanics of machinery. The work in thermodynamics consists in the setting of slide valves, indicating engines measuring the brake horse-power, simple engine and boiler tests and the testing of gas and gasoline engines under various conditions. The mechanical laboratory work deals with the efficiency of belts and ropes as well as of several machines of simple construction. An examination of lubricating oils is also made by means of oil testing machines and other well-known devices. Experiments are also made on the balancing of reciprocating and rotating masses.

36. THERMODYNAMICS:—*R. W. Angus.*

Departments 3 and 7, IV Year; 2 hours per week; both terms.

This is a continuation of the introductory course, the subject being here treated from a general standpoint and the idea of entropy and of the absolute scale of temperatures being introduced. The course includes the treatment of saturated and superheated vapours, gases, the flow of fluids, chimney and boiler efficiency and the theory of various engines and other appliances including air compressors, refrigerating machines, and injectors.

Text book:—Thermodynamics—Peabody.

36a. THERMODYNAMICS:—*L. M. Arkley.*

Departments 3 and 7, IV Year; 1 hour per week, both terms.

Steam Power Plants. This course follows in logical order the courses on heat engines given in the second and third years. In it a study of the prime movers and auxiliary apparatus required in a power plant is made in such a manner as to indicate the proper choice of equipment under various conditions of operation.

37. THERMODYNAMICS:—*R. W. Angus, L. M. Arkley.*

Departments 3 and 7, IV Year; about 10 hours per week.

The work in this year is a continuation and extension of the work covered in the third year laboratory course. Careful tests are made of engines of various types, such as simple, tandem and cross-compound steam engines; steam turbines; refrigerating machines; air engines; injectors and steam pumps, etc.; and an application is made of Hirn's analysis and the entropy diagram to the results obtained. A complete set of experiments is made on each machine and the result plotted so as to show clearly to the student the effect of various alterations in the adjustment of the engine on the resulting efficiency.

Several modern gas and gasoline engines and a gas producer give ample opportunity for the study of this type of engine, and facilities are provided for sampling the gas supply and exhaust.

Two experimental stacks and three boilers enable results to be obtained on boiler efficiency and chimney draft.

**38. STEAM ENGINES:**—*L. M. Arkley.*

Departments 3, 7 and 8, II Year; one hour per week; second term.

This course of lectures includes a discussion of the principles of action of the steam engine; also the theory and design of various simple forms of valve gears used in the operation of such engines.

**39. HEAT ENGINES:**—*L. M. Arkley.*

Departments 3 and 7, III Year; Department 8, IV Year; one hour per week, both terms.

This course in heat engines is intended for students in Mechanical, Electrical and Metallurgical Engineering, to be supplementary to the general course of lectures in thermodynamics.

The principal commercial forms of heat engines are dealt with in a more or less descriptive manner; special attention is given to considerations affecting the design of the ordinary forms of steam engines, gas engines and oil engines.

**39a. POWER:**—*R. W. Angus, L. M. Arkley.*

Departments 1, 2 and 8, IV Year; 21 hours.

A course of experiments with steam and gas engines, compressed air, etc.

## ARCHITECTURE.

**40. HISTORY OF ARCHITECTURE:**—*H. H. Madill.*

Department 4, I Year; one hour per week; both terms.

In this course the development of architecture is treated very briefly and in an elementary manner, from the Pyramids of Egypt to the present, laying special emphasis on the Egyptian, Grecian and Western Asiatic work. The antique Greek and Roman orders are studied, and the students are required to make rendered drawings in the studio of certain orders and elements. An attempt is made to develop the student's sense of proportion, and in the latter part of the second term he is required to study a simple problem in design.

**41. HISTORY OF ARCHITECTURE:**—*H. H. Madill.*

Department 4, II Year; one hour per week; both terms.

The Classical, Early Christian, Byzantine and Romanesque styles of architecture are studied with the aid of the lantern. The student is required to become acquainted with the best examples in these styles in order that his sense of proportion and his taste may be developed and his knowledge of the different elements extended.

**42. HISTORY OF ARCHITECTURE:**—*A. W. McConnell.*

Department 4, III Year; one hour per week; both terms.

In this course the work of the previous year is continued, with special attention to the study of the masterpieces of the Renaissance and modern buildings in planning and detail.

43. HISTORY OF ORNAMENT:—*H. H. Madill.*

Department 4, II Year; one hour per week; both terms.

In this course the development of Ornament is traced from the beginning through Egyptian, Assyrian, Grecian, Roman, Byzantine, Romanesque, Gothic and Renaissance styles. An attempt is made to analyze ornament of the best periods and to systematize the principles followed in form and color. The development and types of mouldings are also studied.

44. HISTORY OF PAINTING:—*C. W. Jefferys.*

Department 4, III Year; one hour per week; first term.

The course will consist of an outline of the history and development of painting and of the minor pictorial arts from the earliest time until the present day.

44a. HISTORY OF SCULPTURE:—*J. L. Banks.*

Department 4, III Year; one hour per week; second term.

The course will consist of an outline of the history and development of the different eras of sculpture ranging from the primitive to the present day.

45. ELEMENTS OF ARCHITECTURE:—*H. H. Madill.*

Department 4, I Year; one hour per week; both terms.

Lectures on the Five Orders of Architecture, their affiliated forms and the other elements used in design. Simple problems in elementary design involving the use of the orders and other elements are set from time to time.

46. ARCHITECTURAL DESIGN:—*A. W. McConnell.*

Department 4, II Year; one hour per week; both terms.

This course is given by means of individual instruction in the classroom by criticisms of the solutions of different problems set during the year and by a series of lectures. It is in this course that the student begins the serious study of design; continued practice in architectural drawing and rendering affords the training necessary to make the student a proficient draughtsman.

47. ARCHITECTURAL DESIGN:—*A. W. McConnell.*

Department 4, III Year.

Theory and practice of Design.

This course is given by individual instruction in the studio and by lectures. The greater part of the course is devoted to problems in design, and forms a continuation of the course given in the preceding year.

48. ARCHITECTURAL DESIGN:—*A. W. McConnell.*

Department 4, IV Year.

The entire course is devoted to advanced academic training in designing the more monumental classes of buildings.

48a. ARCHITECTURAL DESIGN:—*A. W. McConnell.*

Department 4, IV Year; Architectural Engineering Option.

A short course of lectures and studio work referring especially to the artistic side of the design of commercial buildings.

49. FREEHAND DRAWING AND WATER COLOR PAINTING:—*C. W. Jefferys.*

Department 4, I Year; 3 hours per week; both terms.

Drawing from still life objects. Primary freehand perspective.  
Primary pencil charcoal and pen and ink rendering.

49a. Department 4, II Year; 3 hours per week; both terms.

Drawing and monochrome painting from still life.

Drawing from the cast.

Pencil, pen and ink, and monochrome rendering.

Primary water color.

Drawing from landscape and natural objects.

49b. Department 4, III Year; 3 hours per week; both terms.

Drawing from the cast.

Water color from still life. Water color rendering.

Drawing from landscape and natural objects.

Students who are sufficiently advanced are admitted to the Fourth Year Life Drawing Class.

49c. Department 4, IV Year; 3 hours per week; both terms.

Water color from still life and from landscape.

Drawing from life.

Water color rendering.

50. MODELLING:—*J. L. Banks.*

Department 4; I Year; 2 hours per week; both terms.

The Orders. Synopsis of styles.

50a. Department 4; II Year; 2 hours per week; both terms.

The styles elaborated.

Problems in figures and in relation to architecture.

50b. Department 4; III Year; 2 hours per week; both terms.

Styles continued.

Problems, combination of figure, ornament and architecture, and their relative values.

50c. Department 4; IV Year; 2 hours per week; both terms.

Modelling from life.

Anatomy.

Composition of groups.

**52. BUILDING MEASUREMENT:**—*C. H. C. Wright.*

Department 4, I Year; 1 hour per week; both terms.

In this course of lectures the principles of measurements and mensuration with special reference to buildings will be discussed. With this is combined practice in measurements of existing buildings, quantities, etc.

**53. BUILDING MATERIALS:**—*C. H. C. Wright.*

Department 4, III Year; 2 hours per week; both terms.

The structural and aesthetic value of the various building materials.

**54. SANITARY SCIENCE:**—*C. H. C. Wright.*

Department 4, IV Year; 1 hour per week; both terms.

Modern plumbing, its design and installation.

**54a. HEATING AND VENTILATING:**—*C. H. C. Wright.*

Department 4, IV Year; 1 hour per week; both terms.

The design of different systems, where they should be used, heating specifications, etc.

**ASTRONOMY AND GEODESY.****55. ASTRONOMY, ELEMENTARY:**—*C. A. Chant.*

Department 1, II Year; 1 hour per week; both terms.

A course in descriptive Astronomy, explaining the ordinary astronomical terms, and describing the various celestial bodies and their motions. In the evenings opportunity will be given for identifying the stars and for observing with telescopes.

Text book:—Manual of Astronomy—C. A. Young.

**56. ASTRONOMY AND GEODESY:**—*L. B. Stewart.*

Department 1, III Year; 2 hours per week.

The course of lectures deals with the determination of time, latitude, longitude and azimuth, by methods adapted to the use of the surveyor's transit and the sextant. It is designed to fulfil the requirements of the final examinations for Ontario and Dominion Land Surveyors.

In Geodesy an account is given of the principles and methods of a secondary triangulation survey, also of the principles involved in the North-West system of survey.

Text books:—Practical Astronomy as applied to Geodesy and Navigation—Doolittle; Nautical Almanac, 1921.

**57. FIELD WORK:**—*L. B. Stewart, S. R. Crerar.*

Department 1, III Year; about 1 hour per week; first term.

The practical work in this subject comprises observations in the field with the transit and sextant for the determination of time, latitude and azimuth by the methods described in the lectures.

58. ASTRONOMY (Advanced):—*L. B. Stewart.*

Department 1, IV Year; 2 hours per week.

The lecture course in this subject comprises the theory and adjustment of the instruments used in connection with a geodetic survey; the methods of taking and reducing observations for time, longitude, latitude, and azimuth, with the precision required on such a survey; and other matters relating to these subjects.

59. GEODESY AND METROLOGY:—*L. B. Stewart.*

Department 1, IV Year; 2 hours per week.

The lecture course includes a description of the methods of measuring base lines and the angles of a triangulation; the geometry of the spheroid with applications to geodetic problems; the computation of geodetic positions; the solution of large triangles on the earth's surface, and the adjustment of a triangulation; trigonometric and precise spirit levelling; the determination of the figure of the earth by arc measurements, and by the pendulum; the theory of map projections, etc.

60. ASTRONOMY, GEODESY AND METROLOGY:—*L. B. Stewart.*

Department 1, IV Year; about 23 hours per week.

The practical work in the above subjects includes the observation of meridian transits for time and longitude determinations, and of prime vertical transits for latitude, with the astronomical transit instrument; the observation of meridian zenith distances of stars, and of azimuths at elongation for latitude, with the alt-azimuth; theodolite observations for azimuth; observations for latitude with the zenith telescope; the investigation of the constants of the instruments used, and the reduction of all observations; the measurement of a base line with the steel tape and with invar wires, and the determination of the constants of the tape; the measurement of the angles of a triangulation and the adjustment of the angles of network of triangles, etc.

## BIOLOGY.

62. ELEMENTARY BIOLOGY:—*J. H. Faull.*

Department 6, I Year; 3 hours per week; each term.

An elementary laboratory course on the nature and identification of plant and animal tissues and products, with microscope practice.

63a. ELEMENTARY BIOLOGY:—*E. M. Walker.*

Department 1, IV Year.

A special Course of Laboratory work and demonstrations in General Biology, five hours per week, second term.

**64. HYGIENE AND BACTERIOLOGY:**—*J. G. Fitzgerald, R. D. Defries.*

Departments 1, 5 and 6, IV Year.

- (1) This is a course of twenty-five lectures, dealing with the principles of Hygiene and Sanitary Science and including a discussion of the facts in Bacteriology which are necessary for a proper understanding of Hygiene and Sanitary Science. The particular phases of the subject which are of importance from the standpoint of Sanitary Engineering are dealt with.
- (2) This is a laboratory course of five hours per week, second term, dealing especially with the Bacteriology of water, milk and sewage.

**ECONOMICS AND BUSINESS ADMINISTRATION.**

**66. FINANCE:**—

All Departments, II Year; 1 hour per week; second term.

Money and the instruments of credit; stocks and bonds.

**67. COMMERCIAL LAW:**—*A. R. Clute.*

All departments, III Year; 1 hour per week; both terms. General Principles of the Law of Contracts, Principal and Agent, Partnership and Limited Companies (with special reference to the Companies Acts). General view of the following:—Negotiable Instruments, Sale of Goods, Bills of Sale and Chattel Mortgages, Suretyship and Guarantee.

Text-Book:—Stephens' Elements of Mercantile Law (5th Ed., 1911).

**68. CONTRACTS AND SPECIFICATIONS:**—*C. R. Young.*

Departments 1 and 4, IV Year; 1 hour per week; second term.

This course of lectures deals with the fundamental principles of contract and specification writing. The critical examination of typical specifications and agreements by the class forms an essential feature of the instruction.

Text books:—Engineering Contracts and Specifications—Johnson: Elements of Specification Writing—Kirby; Principles of Specification and Agreement Writing—Young.

**69. SHOP MANAGEMENT AND COSTS:**—*H. W. Price, L. M. Arkley.*

Departments 3, 5, 6 and 7, IV Year.

Works management, mechanical specifications, analysis of manufacturing costs, reports.

**70. MINE AND PLANT MANAGEMENT.**

Departments 2 and 8; IV Year; 1 hour per week; both terms.

First term:—*H. E. T. Haultain.*

Cost keeping in its relation to mining operations. The total cost of a ton of ore from the financier's point of view.

Second term:—*G. A. Guess.*

Lectures on labour, supplies and repairs as components of production costs. Plant organization, marketing of ores, smelter settlements, metallurgical economics, labour unions.

**CHEMISTRY.**

75. ELEMENTARY CHEMISTRY:—*E. G. R. Ardagh.*  
 All Departments, I Year; 2 hours per week; both terms.  
 A lecture course in elementary chemistry dealing with the metals and non-metals, with experimental illustrations.
78. INORGANIC CHEMISTRY:—*L. J. Rogers.*  
 Department 6, I Year; 10 hours per week; both terms.  
 A laboratory course of quantitative experiments illustrating the use of the sensitive balance, and confirming the fundamental laws of chemistry; qualitative inorganic analysis; quantitative analysis of pure salts; inorganic preparations; molar weight determinations.  
 Text book:—Manual of Chemical Analysis, Qualitative and Quantitative—Newth.
79. INORGANIC CHEMISTRY:—*E. G. R. Ardagh.*  
 Departments 2, 6 and 8, II Year; 1 hour per week; first term.  
 A lecture course on the chemistry of the metals; a continuation of Course 75.
80. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*  
 Departments 2, 6 and 8, III Year; 1 hour per week; both terms.  
 A lecture course on the principles of chemical analysis; select gravimetric and volumetric methods; technical analysis.
81. ANALYTICAL CHEMISTRY:—*E. G. R. Ardagh.*  
 Departments 1, 2, 3 and 7, II Year; 3 hours per week.  
 Laboratory practice in elementary qualitative and quantitative analysis.  
 Text book:—A Smaller Chemical Analysis—Newth.
82. ANALYTICAL CHEMISTRY:—*J. W. Bain.*  
 Department 2, II Year; 3 hours per week; both terms.  
 A laboratory course in the gravimetric determination of metals and acids, with elementary volumetric analysis.  
 Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.
83. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*  
 Department 8, II Year; about 12 hours per week.  
 A laboratory course comprising gravimetric and volumetric methods, acidimetry and alkalimetry.  
 Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.
84. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*  
 Department 6, II Year; 11 hours per week; both terms.  
 A laboratory course in qualitative and elementary quantitative chemical analysis; inorganic preparations.  
 Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

85. ENGINEERING CHEMISTRY:—*J. W. Bain.*

Departments 1, 2, 3, 6, 7 and 8, II Year; 1 hour per week; second term.

A lecture course consisting of a study of the industrial production and application of heat and light, and of the chemistry of fuel and the products of combustion.

86. INDUSTRIAL CHEMISTRY:—*J. W. Bain.*

Department 6, II Year; 1 hour per week; both terms.

A lecture course on the manufacture of salts, acids, alkalies and inorganic chemicals.

87. ORGANIC CHEMISTRY:—*M. C. Boswell.*

Departments 1, 2, 3 and 7, II Year; 1 hour per week; first term.

A lecture course in elementary organic chemistry.

Text book:—Theoretical Organic Chemistry—Cohen.

88. ORGANIC CHEMISTRY:—*M. C. Boswell.*

Department 6, II Year; 2 hours per week; both terms.

A lecture course dealing with the aliphatic compounds.

Text book:—Theoretical Organic Chemistry—Cohen.

90. PHYSICAL CHEMISTRY:—*F. B. Kenrick.*

Departments 6 and 8, II Year; 2 hours per week; both terms.

A course of lectures on the elements of chemical mechanics, and the theory of solutions.

91. ANALYTICAL CHEMISTRY:—*E. G. R. Ardagh.*

Department 2, III Year; 9 hours per week; for one term.

A laboratory course on the technical analysis of ores and furnace products.

92. INDUSTRIAL CHEMISTRY:—*E. G. R. Ardagh.*

Department 6, III Year; about 10 hours per week.

A laboratory course in industrial chemistry.

93. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*

Department 8, III Year; about 7 hours per week.

A laboratory course in metallurgical analysis.

94. ENGINEERING CHEMISTRY:—*J. W. Bain, E. G. R. Ardagh.*

Departments 1, 2, 3, 6 and 7, III Year; 1 hour per week; both terms.

A lecture course on the application of chemistry to engineering problems; air, water, sewage, the materials of construction, explosives, etc.

56 UNIVERSITY OF TORONTO CALENDAR 1920-1921.

95. INDUSTRIAL CHEMISTRY:—*E. G. R. Ardagha*.

Department 6, III Year; 9 hours per week; both terms.

A lecture course on petroleum and its products, coal tar and its products; fats, oils, soap, sugar, starch, and gums; fermentation industries, etc.

96. CHEMICAL PLANT:—*J. W. Bain*.

Department 6, III Year; 1 hour per week; both terms.

A lecture course on the machinery and plant used in chemical manufacturing.

97. ORGANIC CHEMISTRY (A):—*M. C. Boswell*.

Department 6, III Year; 2 hours per week; both terms.

A lecture course on the aromatic series.

Text book:—Theoretical Organic Chemistry—Cohen.

98. ORGANIC CHEMISTRY (B):—*F. B. Allan*.

Department 6, III Year; 1 hour per week; second term.

A lecture course on stereoisomerism, desmotropism, etc.

99. ORGANIC CHEMISTRY:—*M. C. Boswell*.

Department 6, III Year; 9 hours per week; 6 weeks.

A laboratory course in organic preparations in the aromatic series; organic analysis.

101. ELECTROCHEMISTRY:—*W. L. Miller*.

Departments 6, 7 and 8, III Year; Department 2, IV Year; 2 hours per week; first term.

A lecture course on elementary electrochemistry, illustrated by experiments.

102. ELECTROCHEMISTRY:—*W. L. Miller and J. T. Burt-Gerrans*.

Departments 6, 7 and 8, III Year; 3 hours per week; first term.

A laboratory course in quantitative measurements to accompany Course 101.

103. INORGANIC CHEMISTRY:—*J. W. Bain*.

Departments 5 and 6, IV Year; 1 hour per week; first term; 2 hours per week; second term.

A lecture course on chemical theory.

104. ORGANIC CHEMISTRY:—*M. C. Boswell*.

Departments 5 and 6, IV Year; 1 hour per week; both terms.

A lecture course on advanced organic chemistry.

195. ORGANIC CHEMISTRY:—*M. C. Boswell.*  
 Departments 5 and 6, IV Year  
 A laboratory course in advanced organic chemistry.
106. INDUSTRIAL CHEMISTRY:—*J. W. Bain.*  
 Departments 5 and 6, IV Year; 1 hour per week; both terms.  
 A lecture course on selected subjects in chemical technology.
107. INDUSTRIAL CHEMISTRY:—*J. W. Bain, E. G. R. Ardagh.*  
 Departments 5 and 6, IV Year; about 28 hours per week; both terms.  
 A laboratory course in industrial problems.
108. ELECTROCHEMISTRY:—*J. T. Burt-Gerrans.*  
 Departments 5, 6 and 7, IV Year; 2 hours per week; both terms.  
 An advanced lecture course on the theory of solutions and electrolysis, and the application to the practice of electro-deposition and electrolytic refining of metals. The course also includes lectures on the electric furnace with special consideration of efficiency.  
 Text books:—Electrometallurgy—Borchers; Electrochemistry—Le Blanc; Electrochemistry—Luepke.
109. ELECTROCHEMISTRY:—*W. L. Miller and J. T. Burt-Gerrans.*  
 Departments 5, 6 and 7, IV Year; about 28 hours per week.  
 A laboratory course accompanying Course 108.
110. SANITARY AND FORENSIC CHEMISTRY:—*J. W. Bain.*  
 Departments 5 and 6, IV Year; 1 hour per week; both terms.  
 A lecture course on the composition and examination of air, water and food; poisons and their detection.
111. SANITARY AND FORENSIC CHEMISTRY:—*J. W. Bain.*  
 Departments 5 and 6, IV Year.  
 A laboratory course accompanying Course 110.
112. ANALYTICAL CHEMISTRY:—*E. G. R. Ardagh.*  
 Department 2, IV Year, 12 hours per week; first term.  
 A laboratory course comprising analysis of ores and furnace products.
113. SANITARY CHEMISTRY:—*H. M. Lancaster, E. G. R. Ardagh.*  
 Department 1, IV Year.  
 A lecture and laboratory course of about 6 hours per week on water supply, sewage disposal, ventilation, etc.

#### DESCRIPTIVE GEOMETRY AND DRAWING.

115. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.*  
 Departments 1, 2, 3, 6, 7 and 8, I Year; 1 hour per week; both terms.  
 This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solutions of problems relating to straight lines and planes.

**116. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.***

Department 4, I Year; 1 hour per week; both terms.

This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solution of problems relating to straight lines and planes, special reference being made to the determination of shades and shadows.

**117. DRAWING:—*J. R. Cockburn.***

Departments 1, 2, 3, 7 and 8, I Year; 11 hours per week, first term; 20 hours per week second term.

Copying from the flat, lettering, topography; graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; the plotting of original surveys; measured drawings.

**118. DRAWING:—*J. R. Cockburn, H. H. Madill.***

Department 4, I Year; 9 hours per week first term; 18 hours per week second term.

Copying from the flat, lettering, rendering the graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; measured drawings. Elements and principles of Architecture.

**119. DRAWING:—*J. R. Cockburn.***

Department 6, I Year; 4 hours per week both terms.

Copying from the flat, lettering, graphical solution of problems in statics, problems in descriptive geometry.

**121. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.***

Departments 1, 2, 3, 7 and 8, II Year; 1 hour per week; both terms.

This course of lectures is a continuation of the work taken in the first year with the following additions: Problems relating to curved surfaces, principles of shades, shadows and perspective.

**122. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.***

Department 4, II Year; 1 hour per week; both terms.

This course of lectures is a continuation of the work taken in the First Year with the addition of problems relating to curved surfaces, shades, shadows and perspective.

**123. DRAWING:—*J. R. Cockburn.***

Departments 1 and 2, II Year. Department 1, 6 hours per week first term; 12 hours per week second term. Department 2, 3 hours per week first term; 12 hours per week second term.

Coloring and shading as applied to both topographical and construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics and strength of materials; measured drawings; elementary design.

**124. DRAWING:**—*J. R. Cockburn.*

Departments 3 and 7, II Year; Department 3, 14 hours per week first term; 10 hours per week second term; Department 7, 12 hours per week both terms.

Coloring and shading as applied to construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics, theory of mechanism and strength of materials; measured drawings; elementary design.

**125. DRAWING:**—*J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.*

Department 4, II Year; 17 hours per week; both terms.

Exercises from the orders of architecture; principles of shades, shadows and perspective; elementary architectural design; problems in descriptive geometry relating to solids bound by curved surfaces; solution of problems in optics and strength of materials; measured drawings.

**126. DRAWING:**—*J. R. Cockburn.*

Department 6, II Year; 7 hours per week first term; 3 hours per week second term.

(Same as Department 3 with the exception of descriptive geometry.)

**127. DESCRIPTIVE GEOMETRY:**—*J. R. Cockburn, W. J. Smither.*

Department 1, III Year; 1 hour per week; first term.

This course of lectures deals with spherical projections, the principles of mapmaking, and the graphical solution of spherical triangles.

**128. DRAWING:**—*J. R. Cockburn, C. R. Young.*

Department 1, III Year; 8 hours per week first term; 18 hours per week second term.

Principles of mapmaking, spherical projection, plotting of original surveys relating to topographical and railway work; problems in theory of construction; original design of various structures; measured drawings.

**129. DRAWING:**—*J. R. Cockburn.*

Department 2, III Year; 7 hours per week first term; 2 hours per week second term.

Plotting of original surveys, relating to topographical and railway work and mining; problems in theory of construction; original design; measured drawings.

**130. DRAWING:**—*J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.*

Department 4, III Year; 13 hours per week, first term; 22 hours per week, second term.

Architectural design; advanced work in monochrome and colours; problems in shades, shadows and perspective; problems in theory of construction, including framed structures.

131. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.*

Department 4, III Year; 1 hour per week; first term.

Advanced work in shades, shadows and perspective.

132. DRAWING:—*J. R. Cockburn, C. R. Young.*

Departments 3, 6 and 8, III Year; Department 3, 8 hours per week, first term; 2 hours per week, second term; Department 6, 3 hours per week, both terms; Department 8, 3 hours per week, first term. Problems in design dealing with the theory of structures.

133. DRAWING:—*C. R. Young, W. J. Smither.*

Department 1, IV Year; 17 hours per week, first term; 16 hours per week, second term.

Problems in structural design.

133a. DRAWING:—*C. R. Young, W. J. Smither.*

Department 1, IV Year; 6 hours per week, first term; 5 hours per week, second term.

Problems in structural design.

134. DRAWING:—*C. R. Young, W. J. Smither.*

Departments 3 and 4, IV Year; 3 hours per week, both terms.

Problems in mill building design.

134a. DRAWING:—*C. R. Young, W. J. Smither.*

Department 3, IV Year; 4 hours per week, first term; 6 hours per week, second term.

Problems in structural design.

## ELECTRICITY.

135. ELECTRICITY:—*H. W. Price.*

Departments 1, 2, 3, 6, 7 and 8, I Year; 2 hours per week; both terms.

A course of lectures on basic principles relating to electric circuits, magnetic circuits, instruments and apparatus in general, distribution of electrical energy, etc., illustrated largely from commercial apparatus. The point of view of this work is quantitative rather than descriptive, for it is believed that men who can solve engineering problems are most likely to grasp underlying principles.

138. ELECTRICITY:—*W. S. Guest.*

Departments 3, 6 and 7, II Year; 2 hours per week; both terms.

Deals with the theory of electrical measurements, and detailed study of various methods applicable under different conditions in engineering practice to the measurement of resistance, current, potential difference, power and energy; calibration of commercial measuring instruments. The effect of choice of conditions of measurement on the accuracy of the result is considered.

**139. ELECTRICAL LABORATORY:**—*W. S. Guest.*

Departments 3, 6 and 7, II Year; 3 hours per week; both terms.

This laboratory course is closely associated with the lecture course 138 on electricity for the second year. The more important and useful methods of testing generators and circuits for electromotive force, resistance, current, grounds, etc., are practised, often under conditions such as occur in practice. The work also includes methods of calibration of measuring instruments for voltage, current, power and energy, and certain studies of properties of incandescent lamps.

**140. ELECTRICITY:**—*H. W. Price.*

Departments 1 and 4, IV Year; 1 hour per week.

A course designed to fit the requirements of non-electrical students.

*Electricity*  
A study of essential principles is followed by discussion of electrical apparatus plants, power transmission, railways, etc.

**141. POWER:**—*A. R. Zimmer.*

Departments 2, 6 and 8, IV Year; 21 hours.

Under the name "Power" a number of operating experiments are arranged to afford some familiarity with measuring instruments and direct and alternating current machinery.

**142. MAGNETISM AND ELECTRICITY:**—*T. R. Rosebrugh.*

Departments 3 and 7, III Year; 2 hours per week; both terms.

A course of lectures on theory of magnetism and magnetic circuits, theory of direct current generators, motors, etc.

**143. ALTERNATING CURRENT:**—*T. R. Rosebrugh.*

Departments 3 and 7, III Year; 1 hour per week.

A first course of lectures on alternating current, covering principles of measurement and leading to the analytical and graphical treatment of the simpler problems relative to alternating current circuits and machinery.

**144. ELECTRICAL LABORATORY:**—*A. R. Zimmer.*

Department 3, III Year;  $4\frac{1}{2}$  hours per week; Department 7, III Year; 6 hours per week.

This laboratory course is intended to afford the student an opportunity to become familiar with principles involved in continuous current shunt, series and compound wound generators and motors, and, to some extent, alternating current circuits and machinery. Other sections of the work deal with the magnetic properties of iron and steel, and study of iron losses in transformers and generators.

The course is arranged to stand in close relation to the lecture courses in the subjects of magnetism and electricity and alternating current (142, 143) for III Year, and to certain design work (145).

145. ELECTRICAL DESIGN:—*H. W. Price.*

Department 7, III Year; 1 hour per week.

A course of lectures dealing with design of electric machinery and plants, accompanied by designs to be worked out in the design room.

146. ELECTRICAL DESIGN:—*H. W. Price.*

Department 7, III Year; 3 hours per week.

A design room is set apart for working out designs of electrical apparatus such as transformers, generators, motors, auxiliary apparatus, etc.

Special forms and notes are employed, arranged to suit the various studies. Certain models are provided to assist where necessary.

147. APPLIED ELECTRICITY:—*T. R. Rosebrugh.*

Department 7, IV Year; 3 hours per week.

This course deals by analytical and vector methods with the theory of alternating current circuits and machinery. Applications of theory are considered with regard to transformers, single and polyphase generators, synchronous motors and rotary converters, induction and commutating series motors, transmission lines, wave analysis, etc.

148. ELECTRICAL LABORATORY:—*A. R. Zimmer.*

Department 7, IV Year, in connection with 147; 20 hours per week.

This laboratory course involves a thorough study of principles and properties of single and polyphase circuits and apparatus. Both vector and analytical methods are applied to the solution of problems based on tests made on laboratory machines.

The work deals mainly with constant voltage and constant current transformers, single and polyphase alternators, synchronous motors, rotary converters, induction and single phase commutating motors, transmission line, etc. The work does not consist only of factory tests, but is designed to lead the student to apply theory to practice as illustrated in the apparatus under test, with a view to an exact understanding of methods and an appreciation of limitations under many conditions. Free use is made of the oscillograph as a necessary device for "seeing" conditions under investigation. The best commercial measuring instruments are available.

### GEOLOGY.

150. GEOLOGY (Elementary):—*W. A. Parks.*

Department 2, II Year; Department 1, III Year; 1 hour per week; both terms.

This course deals chiefly with historical geology with special reference to Canadian formations.

Reference books:—Introduction to Geology—Scott; Text Book of Geology—Dana.

182. METALLURGY:—*G. A. Guess.*

Department 2, IV Year; 6 hours' laboratory work per week; second term.

Calibration of pyrometers, blast furnace smelting and copper converting, cyanidation, acid leaching of copper ores, electrolytic refining of lead and copper, electrometallurgy.

183. METALLURGY:—*G. A. Guess.*

Departments 2, 6 and 8, II Year; 1 hour per week; second term.

An introduction to the study of metallurgy.

184. METALLURGY:—*G. A. Guess.*

Departments 2 and 6, III Year; 1 hour per week; both terms.

Fuels, temperatures of combustion, Specific heat, conductivity and problems thereon. Chimneys, furnaces, refractories, outlines of furnace metallurgy and hydro-metallurgy.

185. METALLURGY:—*G. A. Guess.*

Department 8, II Year; 1 hour per week, both terms.

A lecture course in the study of metallurgical fuels, their use, preparation, calorific value and temperature of combustion. Problems.

186. METALLURGY:—*G. A. Guess.*

Department 8, III Year; 1 hour per week; first term.

Lecture course preparatory to study of metallurgical processes and methods.

Two hours' laboratory per week; first term.

Four hours per week; second term.

Lecture and class room work, metallurgical processes and methods.

Six hours laboratory per week; second term.

186a. METALLURGY:—*G. A. Guess.*

Department 8, IV Year; 2 hours per week, both terms, and 8 hours laboratory work, both terms.

Design and arrangement of plants. Metallurgical book keeping, balance sheets, thermal balance sheets. Refining processes.

The metallography of iron and steel and non-ferrous alloys.

186b. PLANT DESIGN:—*G. A. Guess.*

Department 8, IV Year; 2 hours per week, both terms, during which is taken up a study of metallurgical flow sheets of typical plants; a critical reading and discussion of papers and articles describing metallurgical process or dealing with plant arrangement and construction; a consideration of some of the problems entering into general design of metallurgical plants.

## MATHEMATICS.

187. ALGEBRA:—*A. T. DeLury.*

Departments 1, 2, 3, 6, 7, 8, 1 Year; 2 hours per week; both terms.

Simple equations of one, two and three unknown quantities; quadratic equations of one and two unknown quantities; graphic

representation of functions and the introduction of the gradient function; proportion and progressions; interest forms and annuities, permutations, combinations, limits, the general theory of infinite series, binomial theorem, exponential and logarithmic series.

**Text book:**—Intermediate Algebra—DeLury.

**188. ANALYTICAL GEOMETRY:**—*I. R. Pounder.*

All Departments, I Year; 1 hour per week first term; 2 hours per week second term.

The course in Elementary Analytical Geometry covers the more familiar propositions in connection with the straight line, circle, parabola, ellipse and hyperbola. The subject is treated so as to illustrate the general methods of analytical geometry.

**189. TRIGONOMETRY, PLANE:**—*M. A. Mackenzie.*

Departments 1, 2, 3, 6, 7, 8, I Year; 2 hours per week; first term.

Solutions of triangles and practical problems.

**Text book:**—Practical Trigonometry—Plane and Fawdry.

**190. CALCULUS, DIFFERENTIAL AND INTEGRAL:**—*S. Beatty.*

Departments 1, 2, 3, 4, 6, 7 and 8, II Year; 2 hours per week; both terms.

This is an elementary course in the infinitesimal calculus, but adequate to afford a knowledge of the character and methods of the subject and to enable students in chemistry, engineering, etc., to understand such of their text books as introduce the calculus.

**191. TRIGONOMETRY, SPHERICAL:**—*L. B. Stewart.*

Department 1, II Year; 1 hour per week; first term.

A course of lectures includes the derivation of formulæ and their application to the solution of triangles and to practical problems.

**Text book:**—Spherical Trigonometry—Todhunter and Leatham.

**192. LEAST SQUARES, METHOD OF:**—*L. B. Stewart.*

Department 1, III Year; 1 hour per week; first term.

The course of lectures includes: The general principles of probability, the law of error, direct measurements of equal and different weights; mean square and probable errors; indirect measurements; conditioned observations; applications to empirical constants and formulæ, etc.

**Text book:**—Least Squares—Merriman.

### ENGINEERING PROBLEMS.

**193. Departments 1, 2, 3, 6, 7, 8, I Year;** 1 hour per week; both terms.

In this course the time is devoted to problem work involving an application of the theory and principles laid down in the lecture course of the various subjects of the First Year.

TECHNICAL PHYSICS.

195. ACOUSTICS:—*G. R. Anderson.*

Department 4, III Year.

Wave motion, propagation, reflection and transmission of sounds.

Laws of vibrating strings, pipes and forks. Velocity of sound.

Musical scales. Absorption of sound by various substances, use of deadening material in buildings. Amount of reverberation permissible and desirable in public buildings. Lectures and laboratory work.

196. HYDROSTATICS:—*G. R. Anderson.*

All Departments, II Year.

Laws of fluid pressure and application to machines. Density of solids and fluids, theory of flotation.

Lectures and laboratory work. Spring term.

197. OPTICS:—*G. R. Anderson.*

Departments 1, 2, 3, 6 and 7, II Year.

Rectilinear propagation of light, illumination, photometry, light standards. Distribution of light by reflectors and diffusers, general and selective absorption, economic values of artificial lights.

Laws of reflection and refraction, theory of optical instruments.

Light considered as wave motion, dispersion, spectrum analysis, colour phenomena, polarization.

Lectures and laboratory work, both terms.

198. HEAT:—*G. R. Anderson.*

Departments 1, and 8, III Year.

Generation and propagation of heat. General and industrial thermometry, calorimetry and pyrometry. Linear and cubical expansion, gas laws. Specific heat of solids, liquids and gases, latent heat of fusion and vaporization. Mechanical equivalent of heat. Carnot cycle.

Lectures and laboratory work, Fall term.

199. PHOTOGRAPHY:—*G. R. Anderson.*

Departments 1 and 4, III Year; Departments 3 and 7, IV Year.

The camera and its adjustments, lenses, shutters, screens. Plates for various purposes, films, prevention of halation. Lighting, exposure, development. Paper of various kinds, printing, enlargement and reduction, blue printing and allied processes. Record photography, photogrammetry and photo-surveying. Photography in colour.

Lectures Fall term, and laboratory work both terms.

200. ILLUMINATION:—*G. R. Anderson.*

Department 4, II Year.

Principles of interior and street illumination. Artificial lighting of public and private buildings, etc.

**SURVEYING.****205. SURVEYING:—*S. R. Crerar.***

Departments 1, 2, 3, 7 and 8, I Year; 1 hour per week; both terms. The lecture course includes the general principles; surveying with the chain, the compass and chain and the transit and chain, and level, the applications of trigonometry to inaccessible heights and distances; mensuration of surfaces, co-ordinate surveying, division of land, etc.

Text books:—Plane Surveying—Tracy; Theory and Practice of Surveying—Johnson and Smith.

**206. FIELD WORK:—*S. R. Crerar, E. W. Banting.***

Departments 1, 2, 3, 7 and 8, I Year; 5 hours per week; first term. This course comprises testing chains; practice in chaining; a complete survey of a piece of land with the chain and transit; keeping of field notes; the use of the transit and compass in surveying closed figures and traverse lines and in ranging straight lines; plotting by latitudes and departures, and otherwise computing areas. Instrumental work with level.

**207. SURVEYING:—*W. M. Treadgold, E. W. Banting.***

Departments 1 and 2, II Year; 1 hour per week; both terms.

This course of lectures takes up in detail, simple, reverse and compound curves as applied to railroad surveying. It also includes stadia, plane table and photographic surveying as applied to topographic work, and the main features of mine and hydrographic surveying.

Text books:—Henck, Searles, Allen (Field books for Engineers) Theory and Practice of Surveying—Johnson and Smith; Surveying—Breed and Hosmer.

**208. FIELD WORK:—*W. M. Treadgold, E. W. Banting, S. R. Crerar.***

Departments 1 and 2, II Year; 9 hours per week; first term.

This course of instruction embraces all adjustments of the transit and level, minor problems in triangulation and traversing—levelling and plane table practice.

**209. SURVEYING AND LEVELLING:—*W. M. Treadgold, E. W. Banting.***

Department 1, III Year; 1 hour per week; both terms; Department 2, III Year; 1 hour per week; first term.

This course of lectures takes up the work of the railroad engineer on construction, including profiles, cross sectioning, computation of volume of earthwork, haul, transition curves, laying out turnouts, frogs and switches, etc.

Also a discussion of trigonometric and barometric levelling.

Text books:—Field Engineering—Searles; Railroad Curves and Earthworks—Allen.

**210. FIELD WORK:**—*W. M. Treadgold, E. W. Banting, S. R. Crerar.*

Departments 1 and 2, III Year.

This includes adjustments of levels and determination of profile, cross sectioning and computation of earthwork of located line on ground and plotting of same; also cross sectioning by use of hand level. A complete stadia topographic survey is made and plotted. Micrometer work and plane table traverse are also taken up.

This work is to be taken at Gull Lake Camp (see page 21.)

**ADDITIONAL, FOURTH YEAR OPTIONS.**

**211. RAILWAY ENGINEERING:**—*W. M. Treadgold.*

Department 1, IV Year; about 2 hours per week.

The object of this course is to make the student acquainted with the general principles of railroad and street railway engineering, and the subject will be studied from the standpoint of economic theory of location; train resistance; effect of grade, distance and curvature and rise and fall; maintenance of way; yards and terminals; tunnels, and street railway practice.

**212. FIELD WORK:**—*W. M. Treadgold.*

Department 1, IV Year; about 11 hours per week; first term.

The work consists of an original survey for a railroad some one or two miles in length, the work being conducted according to the most modern methods of location. Upon the completion of this work a contour map of the district surveyed is plotted in the drafting room and a line adjusted to it. This is staked out in the field, profiles taken and complete estimates of the cost of construction made.

**213. SANITARY ENGINEERING.**

*Sanitary Chemistry* (113).

*Biology* (63a).

*Hygiene and Bacteriology* (64).

*Re-inforced Concrete* (22).

*Hydraulics* (32b, 32c).

*Miscellaneous Structures* (24b).

*Sanitary Engineering:*—A lecture course of 1 hour per week, both terms, in which consideration is given to the problems of water supply and sewage disposal as viewed by the engineer. Some practice in the design of works from assumed data is afforded.

Reference books:—Public Water Supplies—Turneaure & Russell; American Sewerage Practice—Metcalf & Eddy, 3 vols.

**214. HIGHWAY ENGINEERING:**—

Department 1, IV Year.

A lecture and laboratory course of about 8 hours per week, dealing with materials, design and construction of highways and pavements and the testing of various materials used in such work.

**215. STRUCTURAL ENGINEERING:—**

Students in Civil Engineering who desire to specialize in the subjects best fitting them for designing or constructing engineers on bridge-building or other analogous work, may do so by selecting the Structural Engineering Option in the fourth year. In addition to the obligatory subjects, the following lecture and laboratory courses are provided for those selecting this option:

*Theory of Structures* (16).

*Strength and Elasticity of Materials* (17).

*Iron and Steel* (23).

*Reinforced Concrete* (22).

*Structural Design* (24).

*Mill Building Design* (24a).

*Miscellaneous Structures* (24b).

**216. ARCHITECTURAL ENGINEERING:—**

Architectural students desiring to give special attention to the structural design of buildings may do so by electing to take the Architectural Engineering Option in the fourth year. The following subjects, in addition to those required of all students in the fourth year in Architecture, are required:

*Mill Building Design* (24a).

*Architectural Design* (48a).

**MODERN LANGUAGES.**

**217. FRENCH:—*J. H. Cameron, Miss J. C. Laing.***

Required in Department 4, I Year; 2 hours per week; both terms;  
II year, 1 hour per week; both terms.

An elementary course intended to train the student in the translation  
of scientific journals and treatises.

**218. GERMAN:—*G. H. Needler.***

Required in Department 6, all years; 1 hour per week; both terms.

An elementary course intended to train the student in the translation  
of scientific journals and treatises.

**218a. SPANISH:—*M. A. Buchanan.***

Department 8, II Year; 1 hour per week; both terms.

An introduction to Spanish grammar, pronunciation and practice in  
reading Engineering Spanish.

**THESIS.**

**219. THESIS.**

Required in all Departments, IV Year, with the exception of Department 4, Architectural Design Option.

Each student is required to prepare a thesis of between six thousand  
and seven thousand words on a subject approved by Council.  
See circular of information.

## OUTLINE OF VACATION WORK

### 220. CONSTRUCTION NOTES.

II Year. See special circular of information.

The construction notes required consist of neat and complete dimensioned sketches in pencil of any structures, machines or plants which may be of interest. Any object chosen should be represented and dimensioned in such a manner that it could be completely constructed from the notes as the only available information.

From students in Department 2, who have been actually engaged during the summer with Government or other approved geological survey parties, geological field notes will be accepted in lieu of construction notes.

## MASTER OF APPLIED SCIENCE DEGREE.

1. A candidate for the degree of Master of Applied Science (M.A.Sc.) shall hold the degree of Bachelor of Applied Science (B.A.Sc.) of this University.
2. He shall spend not less than one academic year in attendance as a student, in the Faculty of Applied Science, on a course of study approved by the Council.
3. He shall present a satisfactory thesis on a subject approved by the Council.
4. He shall pass such examinations as the Council may decide.
5. The candidate must register at the beginning of the academic year.

## PROFESSIONAL DEGREES.

The attention of graduates is directed to the following regulations respecting professional degrees.

The following degrees have been established: Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem.E.), subject to the following regulations:

1. A candidate for one of the said degrees shall hold the diploma of the School of Practical Science or of the Faculty of Applied Science and Engineering or the degree of Bachelor of Applied Science.
2. He shall have spent at least three years after receiving the diploma or the degree in the actual practice of the branch of engineering wherein he is a candidate for a degree.
3. Intervals of non-employment or of employment in other branches of engineering shall not be included in the above three years. It shall not be necessary that the several periods requisite to make up the said three years be consecutive.

4. Satisfactory evidence shall be submitted to the University examiners as to the nature and length of the candidate's professional experience for the purpose of clauses 2 and 3.

The Examiners shall satisfy themselves by oral or written examinations in regard to the candidate's experience and competence.

5. The candidate shall prepare an original thesis on some engineering subject in the branch in which he wishes a degree, the said thesis to be accompanied by all necessary descriptions, details, drawings, bills of quantities, specifications and estimates.

The candidate may be required at the option of the Examiners to undergo an examination in the subject of this thesis.

6. Notice in writing shall be sent to the Secretary not later than the first day of February, informing him of the degree to which the candidate wishes to proceed and of the title of his proposed thesis for the approval of the Examiners.

7. The evidence under clause 4, and the thesis, with accompanying papers, described in clause 5, shall be sent to the Secretary not later than the first day of April.

8. The candidate shall be required to present himself for examination in the month of April at such time as may be arranged by the Examiners.

9. The fee for any one of the said degrees shall be twenty dollars, and shall be paid to the Bursar not later than the first day of April.

10. The thesis, drawings, and other papers submitted under clause 7 shall become the property of the University.

## LABORATORY EQUIPMENT.

### THERMODYNAMIC AND MECHANICAL LABORATORY.

The University in 1909 completed the erection of a large, well-equipped building for the accommodation of the steam, gas, mechanical and hydraulic laboratories. A more complete description of the laboratories has been published elsewhere, so that the present description is only intended to give the main features.

The part of the building set apart for thermodynamics and other mechanical work is the ground floor of a room 60 ft. x 155 ft. This room is lighted entirely from the roof in a very perfect way. A part of the space 40 ft. wide running the entire length of 155 feet is served by a 3-ton travelling crane and contains the following equipment:

50 h.p. Brown engine with separate jackets on both heads and barrel of cylinder.

Two-stage Rand air compressor having compound steam cylinders, each fitted with Meyer cut-off gear. The low pressure air cylinder has Corliss inlet gear.

30 h.p. high-speed Leonard tandem compound engine with shaft governor.

15 h.p. high-speed McEwen engine.

75 h.p. two-line compound Willans engine.

15 h.p. DeLaval turbine with special nozzles for condensing and non-condensing tests.

Two 15 h.p. Leonard engines with different types of valves, which are used for valve setting.

There are also two surface condensers with air pumps so arranged that any engine in the laboratory may be made to exhaust into the atmosphere through an open heater or into one of the condensers, the change from one arrangement to the other being accomplished in a few minutes without the aid of valves.

The laboratory further contains:

A 3 ton York refrigerating machine with tanks.

An Amsler transmission dynamometer.

Apparatus for testing injectors and steam pumps.

Numerous other pieces of apparatus and instruments.

The work on internal combustion engines and producers is performed on the following:

18 h.p. Canada suction gas producer.

14 h.p. National gas engine arranged for various compressions and points of ignition.

10 h.p. Fielding and Platt engine for city gas or coal oil, having various adjustments.

8 h.p. Otto gas engine.

6 h.p. marine gasoline engine.

Ericsson air engine.

Various accessories to above machines.

Steam for the laboratory is supplied by two 50 h.p. and one 100 h.p. Babcock and Wilcox boilers, the latter having an internal superheater. These boilers are located in a separate boiler room. They are used for experimental work only and are fitted up for testing. The gases pass up through two independent chimneys, and these have been arranged so that the draft and other conditions in the chimney at any point of its height may be examined.

In smaller work-rooms off the main laboratory are placed belt and oil testing machines, apparatus for testing the efficiency of gears and machines, and for experiments in the balancing of machinery.

### **HYDRAULIC LABORATORY.**

The hydraulic laboratory occupies two floors each 40 feet x 112 feet, which are well lighted by large windows on the side and end.

The water for the experimental work is pumped through the various pieces of apparatus from a well by means of two turbine pumping units, both of which are driven by a Belliss and Morcom compound engine of 125 h.p. running at a speed of 525 revs. per minute. Both engine and pumps have been installed with a view to using them in experimental work as well as for supply of water for other apparatus used in the laboratory.

The pumping units are capable of delivering one cubic foot of water per second against heads of 250 feet and 300 feet respectively. These units are designed and connected up so that they may be run in series giving the above discharge at 550 feet head, or they may be run in parallel giving double the discharge at a lower head. Each pumping unit consists of two two-stage pumps mounted on a common base and driven by a single pulley, and the construction and piping are such that each two-stage pump may be driven separately or that all may be driven at once, discharging separately one cubic foot per second at about 125 feet head through each of four independent pipes, or else the pumps may be run in series or in parallel. The scheme is thus well adapted to laboratory work, and under the heads used on reaction turbines about six cubic feet per second may be obtained.

The laboratory further contains a large vertical steel tank  $5\frac{1}{2}$  feet diameter by 34 feet high with arrangements for the attachment of nozzles and other mouthpieces, etc. Connections are also arranged for reaction turbines, the tank acting as a reservoir.

The discharge from the turbines or nozzles is measured in a weir tank nearly 6 feet wide and 21 feet long, containing a contracted weir  $4\frac{1}{2}$  feet wide. This weir may be calibrated by two weighing tanks, each having a capacity of about 240 cubic feet.

There are three reaction turbines and two impulse wheels all ready for experiment, the power being measured by brakes and the water by weir or orifices. Amongst the reaction turbines may be mentioned the one designed and built by Escher Wyss & Co., specially for the laboratory.

Smaller orifice and weir tanks, each about  $3 \times 3 \times 12$  feet with necessary measuring tanks, are arranged for instruction in coefficients of various kinds and practice with weirs and orifices.

A Venturi meter and other meters, also an hydraulic ram and similar devices are available for testing, and good facilities have been arranged for investigating friction and other properties of pipes and fire hose.

For special investigations on turbine and centrifugal pumps, other pumps in addition to those already described have been arranged.

The basement of the laboratory contains an open trough 5 feet wide, about 110 feet long, with a large weir at one end. It is intended to use this trough for experiments on the flow in open channels, for measurements of large discharges by means of the weir, and for experiments with current meters and Pitot tubes.

Numerous pieces of smaller apparatus, together with all instruments required, have also been provided, and the laboratory equipment is believed to be very complete.

#### AERONAUTIC EQUIPMENT.

For the purpose of the scientific study of problems connected with aviation and the best design of aeroplanes, and also of all problems connected with the effect of wind pressure, a wind tunnel 4 ft. square has been installed in the Hydraulic Laboratory and equipped with the latest form of balance and all the necessary instruments.

There are available for laboratory demonstration and instruction purposes the following aeroplanes:—one Sopwith S.E. 5A., one Avro Training and two J.N. 4 Curtis Training, all the gift of the Royal Air Force.

The laboratory also contains a number of aeroplane engines of most modern type, both rotary and stationary, and a number of models; and also a complete Hispano Suiza aeroplane. These machines are available for inspection, and are of much help in studying the trend of development and design in the power plant of lightest weight.

**DONATIONS TO THE THERMODYNAMIC AND  
HYDRAULIC LABORATORIES.**

The following donations to the equipment of the laboratories **have been** made through the kindness of those mentioned:

50 h.p. Wheeler Surface Condenser, presented by Mr. F. M. Wheeler, New York.

Blake Feed Pump, presented by the manufacturers.

6-inch New American Turbine, presented by Wm. Kennedy & Sons, Owen Sound, Ont.

Two Crown Water Meters, presented by the National Meter Co., New York, through Mr. M. Warnock, Toronto.

Rock Drill, presented by Sullivan Machinery Co., New York, through Mr. A. E. Blackwood, '95.

Marine Gasoline Engine, presented by Canadian Fairbanks Co., Montreal.

Two engines with different types of valve, presented by Messrs. E. Leonard & Sons, London, Ont.

Bundy trap from American Radiator Co., through Messrs. Russell & Gifford.

Dunham steam trap from C. A. Dunham Co.

Sectional models of valves from American Radiator Co.

Sectional model Mason Reducing Valve by Russell & Gifford.

Tanks, etc., by John Inglis Co. Pressure Fan from Sheldons Ltd. Galt.

In addition to the above, other firms have materially assisted by offering apparatus at or below cost price, among whom may be specially mentioned, The Canadian Rand Drill Co., Sherbrooke, Quebec.

The following machines are gifts from the Royal Air Force:

Liberty Aeroplane Motor 400 h.p.

200 B. h.p. Siddeley Deasey Aero Engine..

120 h.p. Beardmore Aero Engine.

Curtis Engine (Sectional).

Hispano Suiza Aero Engine.

80 h.p. Le Rhone Rotary Engine.

Clerget Rotary Engine.

Gnome Monosoupape Engine.

Admiralty Rotary Engine 150 h.p.

Hispano Suiza Aeroplane.

Models of Engines, etc., and numerous spare parts.

### PHYSICAL LABORATORIES.

The optical laboratory is equipped with Weinhold optical benches and accessories for determining the constants of mirrors and lenses and for demonstrating the construction and use of telescopes, field glasses, microscopes, etc. There is also an equipment consisting of one or more of the following optical instruments:—field glasses, microscopes, reading telescope, small comparators, spectrometer, various types of photometer, small focometer, cathetometer, polariscope, illuminometer, standard gas light testing bench, projecting lanterns, etc.

The photographic laboratory is supplied with a number of hand cameras for the use of students. There are also larger cameras for Departmental work, copying cameras, enlarging lanterns and a kinematograph camera, printer and projector, electric blue-printing machine and the necessary dark rooms.

The hydrostatic laboratory contains a supply of various forms of hydrometers, hydrostatic balance, Jolly balance, Mohr's balance, hydrostatic press, vacuum pumps.

The heat laboratory is equipped with a full supply of calorimeters and accessories for determinations of latent and specific heat, expansion apparatus, air thermometer, apparatus for verification of Boyle's law and pressure and boiling point curve, and for determination of the absolute expansion of mercury, Callendar's apparatus for determination of the mechanical equivalent of heat.

The acoustical laboratory is provided with sonometer, siren, forks ordinary and electric, Lissajous' and Melde's apparatus, organ pipes of various forms, manometric flame apparatus and a special equipment for work in architectural acoustics consisting of torsion chronograph, electropneumatic wind chest and standardized organ pipes and other accessories.

### ELECTRICAL LABORATORIES.

Instrument laboratory.—The equipment of this laboratory is, in part, as follows: A set of D'Arsonval galvanometers conveniently located at tables about the laboratory, a set of resistance boxes for use with the same; measuring instruments, including ammeters, voltmeters, wattmeters, potentiometers and standard cells. Apparatus for the measurement of low resistance, including a ductor, and for high resistance, including a megger; several Carey Foster outfits and a Roller bond tester. There are also experimental lines for practice in locating faults, photometer outfits with rotating devices and various types of arc lamps.

Another room is fitted more especially for calibration of electrical instruments for alternating and direct currents. About one hundred and twenty portable measuring instruments are available for students' use, also standard instruments, including Weston laboratory standards, Kelvin balances and a Wolff potentiometer, with which the portable instruments may be compared.

Machine laboratory.—This laboratory, occupying two large rooms, contains twenty-five dynamos and motors varying in capacity from two to twenty kilowatts, adapted for experiments illustrating the properties of compound, shunt and series dynamos and motors, arc machines, as well as the use of interpoles. Switch-boards, numerous rheostats, lamp racks, starting boxes, circuit breakers, flexible cables, brakes, torsion dynamometers, tachometers, etc., are available for use with the machines.

This laboratory also contains two 15 kw., 25 cycle and two special 15 kw., 60 cycle General Electric polyphase revolving field alternators direct driven by motors, two  $7\frac{1}{2}$  kw. alternators, two rotary converters of 10 kw. and 5 kw. capacity, a  $7\frac{1}{2}$  kw. General Electric polyphase induction motor with slip ring rotor, Westinghouse three-phase squirrel cage induction motors, Wagner single phase motor and unity power factor motor, Swedish General Electric variable speed motor, Westinghouse single phase series motor, Westinghouse alternator, and several three phase and single phase induction motors; also transformers, reactive coils, and other details, as in the direct current sections of the laboratory described above, for experiments on the properties of alternating currents and alternating current apparatus in general. A constant-current transformer with its load of six series arc lamps, a three-element oscillograph, for studying wave forms, a high potential transformer and a mercury arc rectifier may also be mentioned. The students are supplied with Weston, Westinghouse and Thomson portable instruments for measuring purposes.

A motor generator set has been installed, comprising a 65 h.p. motor driving on the same shaft a 30 kw. 110 volt d.c. generator and a 30 kw. 60 cycle 110 volt alternator with direct connected exciter.

Appliances are also provided for the study of saturation and hysteretic properties of samples of iron and steel, and models for exercise in winding armatures.

High tension room. In a separate room with proper automatic devices for safety to the operator, there is installed a 20 kv-a. transformer with a range of voltages up to 200,000 volts. Studies of insulators may be carried out.

#### CHEMICAL LABORATORIES.

The Chemical laboratories are situated in the western half of the Chemistry and Mining building, on the first and second floors. The rooms are large and well lighted, and are supplied with the usual modern equipment.

The first and second year laboratory for qualitative work has accommodation for 112 students, each working space being supplied with water, gas and fume cupboard. The laboratory for quantitative analysis will

accommodate 48 students, and is supplied with commodious fume cupboards and all necessary apparatus. A laboratory with working places for 36 is provided for the students engaged in the study of technical chemistry; it is equipped with appliances for the preparation and testing of chemical products. A laboratory for fourth year students with accommodation for eight workers has been fitted up. Each of these laboratories has its own balance room adjoining furnished with instruments from the best makers and adapted to the particular objects in view.

In addition there are rooms set apart for gas analysis, electrolytic analysis and a specially constructed fireproof laboratory for combustion, crucible and bomb furnaces. A calorimeter room has been equipped in the basement. Each of these laboratories is supplied with apparatus of the most approved design, providing excellent facilities for the prosecution of work in analytical and technical chemistry.

#### ELECTROCHEMICAL LABORATORIES.

The Electrochemical laboratories, which are situated in the Chemistry and Mining building, are provided with special facilities for electrolytic work, including a large storage battery and electroplating dynamo with tanks as well as a good set of apparatus and electrical measuring instruments. The experimental work on electric furnaces is performed in two rooms specially equipped for this purpose with rheostats and switch-board connections to a 120 kw. d.c. generator which supplies the current required.

#### ASSAYING LABORATORIES.

Two assaying laboratories are situated in the basement of the Chemistry and Mining building. One has a floor space of 17 feet x 47 feet, and the other 28 feet x 37 feet. Adjoining each is a room 15 feet x 11 feet, with the necessary equipment for the wet work in connection with assaying. Common to both laboratories is a balance room furnished with gold balances set on a concrete pier. Each of the laboratories contains a number of melting holes for crucible fusions, various gas and oil furnaces both for crucibles and muffles, and two large brick muffle furnaces.

The furniture comprises lockers for the students, tables for the pulp balances and the necessary cabinets and shelving.

Adjoining the assay laboratories is a preparation room (19 feet x 13 feet) which is equipped with a motor, crusher, pulverizer, sample grinder and all the necessary hand pulverizers, screens, etc., for preparing ores for assay.

#### METALLURGICAL LABORATORY.

This laboratory is on the basement floor of the Chemistry and Mining Building. The main room has a floor space of 1600 square feet.

Among the larger furnaces included in the equipment of the laboratory are a six hearth Wedge mechanical roasting furnace, the gases from which pass through Cottrell precipitating pipes 12 inches in diameter, and which are served with rectified current at 50,000 volts. There is also a gas fired

muffle roasting furnace, a Steele-Harvey tilting furnace, a large resistance furnace for high temperature work, two water jacketed blast furnaces and a copper converter.

The laboratory has several small furnaces of various types. Facilities are provided for pyrometric work, for zinc retorting, for furnace gas analysis, for leaching of ores and for the electrolytic refining and precipitation of metals.

There is a laboratory for the testing of clays equipped with grinding pan, ball mill, presses, gas fired and oil fired kilns.

The metallographic laboratory is equipped with power driven polishing tables and microscope with metallographic camera.

### MILLING AND CONCENTRATING LABORATORY.

A detached building, 72 feet x 70 feet in area, contains the milling and concentrating equipment. It is heated, lighted and supplied with electric power from the central plant, and is divided into two parts. The greater part, with 72 feet x 53 feet floor space, and 22 feet high, contains the milling and concentrating equipment. The machinery for the former operations consists of a five-stamp battery erected on concrete foundations, Challenge ore feeder, amalgamating plates, Wilfley table, a clean-up pan, steel settling tanks, a steel tank suspended from the roof girders to furnish a constant supply of water, and a track with travelling crawl to transport ore. This is driven by a 15-horsepower motor.

The concentrating part consists of a set of five revolving trommels for wet screenings, four three-compartment jigs, a trough classifier delivering three products, and two revolving buddles, Wilfley Slimer, Deister Slimer, Richard's Pulsating Classifier, Richard's Pulsating Jig, a dry sizer, besides experimental apparatus of various kinds for experimenting on the falling rates of ore particles, the settling of slimes, surface tension action in oil and flotation methods, etc. The waste products run to the same settling tanks as the tailings from the stamp battery. The ore is handled by a travelling crawl. All the machinery in this part is driven by electric motors.

The lower floor has been fitted up for lixiviation work with apparatus for the treatment of sands and slimes, different types of filter press, vacuum plant agitators, etc.

The plant throughout is intended mainly for teaching and experimental purposes and is made of such a size that numerous experiments can be carried out on small quantities of ore. Tests can also be made on lots of one to ten tons.

The other part of the milling building with 72 feet x 17 feet floor space and 15 feet high is divided into four separate rooms. The largest of the four rooms has an area of 476 square feet and is devoted to the crushing and pulverizing of the ores preparatory to their treatment in the milling

and concentrating room. It is isolated in order to confine the dusty operations as far as possible to this one room, and is equipped with a gyrating crusher of Hadfield's make, a set of Hamilton rolls 16 inches by 12 inches, platform scales for weighing ore, a jib crane, pulleys, buckets, etc., for handling the rock. An adjoining room contains a 30 h.p. motor for driving the machinery of the crushing department, and storage bins for ore, work bench, etc. Another room with 17 feet x 15 feet floor space is furnished with a magnetic separator of the Rowan-Wetherill type, driven by its own motor.

### STRENGTH OF MATERIALS LABORATORY.

This laboratory is intended for the scientific and commercial testing of materials of construction such as iron, steel, timber, concrete and masonry.

It is supplied with the following:

An Emery 50-ton hydraulic machine, built by Wm. Sellers & Co., of Philadelphia, for making tests in tension and compression.

A 100-ton screw power machine, built by Riehle Bros., Philadelphia. It is designed for making tests in tension, compression, shearing and cross-breaking, and will take in posts 12 feet long and beams up to 18 feet in length.

A Riehle 10-ton screw power universal testing machine.

A Riehle 50-ton screw power universal testing machine.

A 15-ton single lever-machine, built by J. Buckton & Co., Leeds, England.

A torsion machine, built by Tinius Olsen & Co., Philadelphia, for testing the strength and elasticity of shafting. This machine will twist shafts up to 16 feet in length and 2 inches in diameter.

A hand power torsion machine of simple mechanical construction, specially designed for the testing of short shafts of a maximum diameter of one inch.

A Riehle transverse testing machine of 5,000 pounds capacity, adapted to specimens up to 48 inches in length.

A Riehle compressometer, with spherical seat attachment for the adjustment of specimens having slightly non-parallel faces. This compressometer will receive specimens up to 10 inches in length.

An Olsen compression micrometer of standard type.

A 20,000 pound Olsen, hand power, wire testing machine, specially fitted for testing wooden columns with both fixed and pivoted ends.

A Riehle abrasion cylinder, built to the standard required by the National Brickmakers' Association, adopted in 1901.

A Berry strain-gauge for spans of 3 inches and 8 inches.

A Nalder dividing engine. This may be used either for the precise division of scales or for the calibration of instruments intended for refined measurements.

A Brinell hardness testing machine.

A Shore scleroscope for testing hardness.

A large number of extensometers of the usual degree of precision. These include the Bauschinger, Martens, Unwin, Ames, Riehle, Johnson, Henning (recording) and other types. In addition there are the usual scales, micrometers, telescopes and reflectors, voltmeters for the determination of metallic contact, and such other appliances as are necessary in the making of precise measurements.

The shop is equipped with a number of high-class machine tools specially fitted for reducing the specimens to the requisite shapes and dimensions with a minimum of hand labour. It is also supplied with the necessary appliances for making ordinary repairs and for making apparatus for special experiment and original investigation.

### HIGHWAY MATERIALS LABORATORY.

This laboratory is equipped for carrying out investigations in the various materials employed in highway construction and maintenance, and comprises the following:

Page impact machine for testing the toughness of road materials.

Diamond core drill for preparing specimens for the toughness test.

Deval abrasion machine for testing the resistance to wear of road materials.

Cementation testing apparatus (Page type) for determining cementing properties of road materials.

Jaw crusher (Mitchell type) for crushing rock for various tests.

Power driven agitator with sieves for the mechanical analysis of sand, gravel and crushed rock.

The laboratory is also equipped with the appliances necessary for examining physical properties:—volatilization, specific gravity, viscosity, melting point, penetration, ductility, etc., of oils, asphalts, tars and other bituminous mixtures used in road construction and maintenance.

### LABORATORY OF ONTARIO BOARD OF HEALTH.

Through the courtesy of the Secretary of the Provincial Board of Health for Ontario the facilities of the excellently equipped laboratory which the Board maintains at Stanley Park have, with certain conditions, been placed at the service of the University for the investigation of problems of interest to the sanitarian and the sanitary engineer. The equipment consists of various types of sewage sedimentation tank, sewage filter, sewage measuring devices, aerators, sterilizing appliances and a complete and representative plant intended for the filtration and sterilization of water by practically all known methods.

**CEMENT TESTING LABORATORY.**

This laboratory is fitted with all the ordinary moulds, sieves, balances, burettes, steaming and drying tanks, tables, and other appliances necessary in making the usual physical tests of a Portland cement. It is also supplied with completely equipped cabinets for individual work. In addition there are the following:

A 2,000 lb. Riehle machine fitted for either tension or compression.

A 2,000 lb. Riehle shot machine for tension.

A 2,000 lb. Fairbanks shot machine for tension.

A 1,000 lb. Olsen automatic shot machine fitted for tests in either tension or cross breaking.

An Olsen soapstone moist closet of modern design.

**METROLOGICAL LABORATORY.**

The department of surveying and geodesy is provided with all the ordinary field instruments, such as transits, levels, compasses, micrometers, sextants, planimeters, plane tables, tapes, chains, etc., with which is carried on the instruction in practical field operations as detailed elsewhere.

A small laboratory is also established in the basement of the observatory described below, containing the necessary instruments for the refined measurements of geodetic surveying; as, a standard yard and metre, a Rogers 10-foot comparator, an invar base measuring apparatus, a Kater's pendulum with vacuum chamber, a level trier, micrometer microscopes, etc.

The geodetic observatory in connection with this department is used for the instruction of students of the Fourth Year in taking observations for time, latitude, longitude, and azimuth by the precise methods used in connection with a geodetic survey. It contains a 10-inch theodolite and zenith telescope by Troughton & Simms; an astronomical transit instrument and an 8-inch theodolite by Cooke; two electro-chronographs; a Howard astronomical clock; a Dent sidereal clock; a Dent sidereal break-circuit chronometer; a wireless receiving instrument; arithmometers, etc.

**GEOLOGICAL AND MINERALOGICAL LABORATORIES.**

In the Chemistry and Mining building on College Street the University possesses a modern laboratory for Geology and Mineralogy.

Courses are given in laboratory work, especially in personal examination of type sets of rocks, fossils, minerals and crystal models. These laboratory exercises serve to illustrate the introductory didactic instruction.

For the encouragement of pure crystallography the laboratories are supplied with goniometers of the various types, crystal models, appliances for the cutting of oriental crystal sections and for the physical examination of the same. Practical petrography is carried on in rooms provided with type sets of rocks, both macroscopic and microscopic. Advanced students are taught to make thin sections of rocks and fossils and to study them microscopically. For students in Mining a laboratory course in the interpretation of geological maps and sections is provided. Typical mining regions are studied in detail and an opportunity is afforded for the examination of specimens illustrating economic geology.

The laboratory for the preparation of thin sections of rocks, minerals and fossils is provided with electric diamond saws and grinding appliances for the various types of work incidental to the preparation of thin sections and museum material.

A room is also provided for advanced work in cartography and geological surveying.

The departments possess 28 petrological microscopes and 5 of other types, so that it is now possible to provide advanced students with instruments and sets of thin sections for their own especial use. The blowpipe laboratory contains 156 lockers, especially designed for apparatus for students.

## LIBRARY.

Rooms have been set apart in the Engineering and the Chemistry and Mining buildings for the housing of such periodicals and other literature of the University Library as is of special interest to the students of this faculty.

The University Library is contained in a building of its own, situated on the east side of the campus, that lies to the south of the Main Building. All students who have paid a library fee to the Bursar of the University are entitled to the privileges of the Library. Besides Reading Rooms the Building contains Departmental Studies, which may be used as study-rooms by honour students in the various branches and in which the Professors hold seminary courses. The Library is opened at 8.45 every morning and remains open until 5.15 in the afternoon (6 p.m. during the second term). Books may not be taken out of the building during the daytime, but are lent for the night shortly before the hour of closing, to be returned the following morning before 10 o'clock. Books not in general demand may, on special application, be borrowed for a longer period. Failure to return a borrowed book at the proper time and other breaches of the regulations are punishable by fine or suspension from the privileges of the Library.

**ROYAL ONTARIO MUSEUM.**

**Archaeology, Geology, Mineralogy, Palaeontology, Zoology.**

Students of the University in all departments are recommended to avail themselves of the privileges of the Museum, which, although under separate control, is intimately connected with the work of the University.

The Museum is open on all week days from 10 a.m. to 5 p.m., and on Sundays from 2 p.m. to 5 p.m. The admission is free to the public on Tuesday, Thursday, Saturday and Sunday. On other days an admission fee of fifteen cents is charged.

By a resolution of the Board of Trustees all regular students of the University may be admitted free on all days of the week by presenting their card of registration.

## SOCIETIES.

### THE ENGINEERING SOCIETY OF THE UNIVERSITY OF TORONTO.

#### Officers for 1920-1921.

<i>President</i> .....	R. W. Downie
<i>Vice-President</i> .....	K. L. Carruthers
<i>Treasurer</i> .....	J. A. Langford
<i>Corresponding Secretary</i> .....	G. R. Marks
<i>Recording Secretary</i> .....	J. Farley
<i>Curator</i> .....	W. E. Bennett
<i>Fourth Year President</i> .....	J. R. McLean
<i>Third Year President</i> .....	H. G. Thompson
<i>Second Year President</i> .....	H. B. Bell
<i>First Year President</i> .....	To be elected
<i>Civil Club Representative</i> .....	P. J. Culliton
<i>Mining Club Representative</i> .....	P. F. McIntyre
<i>Electrical Club Representative</i> .....	M. C. Stafford
<i>Chemical Club Representative</i> .....	A. D. R. Fraser
<i>Architectural Club Representative</i> .....	T. J. Young

The Society meets every second Wednesday during the academic year (except April), beginning with the third Wednesday in October. Papers are read, and discussions are held on engineering subjects. The Society publishes a journal monthly during the year, containing the best papers read at the meetings. A supply department is conducted by the Society, on a co-operative plan, through which instruments, drafting supplies, stationery, etc., may be purchased at a low cost. The Society is divided into five clubs for the purpose of affording a medium of study of matters relating in particular to the different departments of engineering.

**THE INDUSTRIAL CHEMICAL CLUB.****Officers for 1919-1920.**

<i>Hon. President</i> .....	Dr. W. H. Ellis
<i>Hon. Vice-President</i> .....	Prof. J. W. Bain
<i>Chairman</i> .....	H. C. Kerman
<i>Vice-Chairman</i> .....	A. D. R. Fraser
<i>Fourth Year Representative</i> .....	H. B. Cody
<i>Third Year Representative</i> .....	C. P. Lailey
<i>Secretary-Treasurer</i> .....	C. Hamilton
<i>Curator</i> .....	J. C. Bell

The object of the Chemical Club is to promote the study of industrial chemistry and chemical engineering. Illustrated lectures, preceded by an informal dinner and a short musical programme, are held fortnightly, and on the following day an excursion is made to industrial chemical concerns located in the city or vicinity.

**MECHANICAL AND ELECTRICAL ENGINEERING CLUB.****1919-1920.**

<i>Chairman</i> .....	C. R. Hill
<i>Vice-Chairman and Fourth Year Representative</i> .....	H. B. Little
<i>Secretary and Third Year Representative</i> .....	G. F. Tracy
<i>Treasurer and Second Year Representative</i> .....	W. C. C. Duncan
<i>Curator and First Year Representative</i> .....	S. J. Allen

The Club meets every Thursday during the academic year for the discussion of papers relating to mechanical and electrical engineering problems.

**CIVIL ENGINEERING CLUB, 1919-1920.**

<i>Chairman</i> .....	R. Harrison
<i>Fourth Year Representative</i> .....	W. F. Irvin
<i>Third Year Representative</i> .....	P. Culliton
<i>Second Year Representative</i> .....	W. L. Langlois
<i>First Year Representative</i> .....	L. F. Stokes

The Club is addressed during the academic year by practising engineers on modern methods and problems in civil engineering.

**MINING AND METALLURGICAL CLUB****Officers for 1919-1920.**

<i>Hon. President</i> .....	Prof. H. E. T. Haultain
<i>President</i> .....	J. C. E. Skinner
<i>Vice-President</i> .....	C. W. Graham
<i>Secretary-Treasurer</i> .....	H. M. Shepard
<i>Chairman Accommodation Committee</i> .....	C. A. Richardson
<i>Chairman Programme Matter Committee</i> .....	E. R. Gilley
<i>Chairman Excursion Visiting Committee</i> .....	O. H. Hugill

The Club is the official organization representing the undergraduates of Departments 2 and 8 of the Faculty of Applied Science.

The objects of the Club are to promote the spirit of good fellowship and mutual assistance amongst its members, both graduate and undergraduate, to provide a means of meeting together, and for the discussion of pertinent topics.

**UNIVERSITY OF TORONTO ATHLETIC ASSOCIATION  
DIRECTORATE, 1919-1920.**

<i>Honorary President</i> .....	R. A. Falconer, D.Litt., LL.D.
<i>President</i> .....	Prof. M. A. Mackenzie
<i>Vice-President</i> .....	W. A. Dafoe
<i>Secretary-Treasurer</i> .....	T. A. Reed
<i>Physical Director</i> .....	Dr. J. W. Barton

*Directors for 1919-1920:*

Prof. C. H. C. Wright, A. F. Barr, B.A., F.C.A.	Houston, Wendell Holmes,
D. A. C. Martin, D. J. Sinclair	

The Athletic Association has full control over all athletic clubs using the name of the Faculty of Applied Science. The Executive Committee has power to suspend any one from the privileges of membership in the Association for any breach of its regulations, and controls the finances of all athletic clubs in the aforesaid Faculty. The annual membership fee of this Association is fifty cents.

No other moneys are collected for the support of athletics in the Faculty of Applied Science without the sanction of the Executive Committee.

**RUGBY FOOTBALL CLUB OF THE UNIVERSITY OF TORONTO.****Officers for 1919-1920.**

<i>Honorary President</i> .....	Prof. C. H. C. Wright
<i>Honorary Vice-President</i> .....	C. E. Gage
<i>President</i> .....	Wendell Holmes
<i>Secretary</i> .....	H. A. MacLennan
<i>Manager senior team</i> .....	Dan Maclean
<i>Captain senior team</i> .....	J. M. Breen
<i>Captain second team</i> .....	L. M. Murray

1919-20 University of Toronto II team—Intermediate Intercollegiate Champions.

The Mulock Cup, which was presented by Sir Wm. Mulock, M.A., LL.D. to the University of Toronto Rugby Football Club for inter-college competition, brings out each year a large number of contestants from the University and affiliated colleges.

Won in 1919 by Junior Meds.

### **ASSOCIATION FOOTBALL CLUB OF THE UNIVERSITY OF TORONTO.**

Officers for 1919-1920.

<i>Honorary President</i> .....	Prof. C. B. Sissons
<i>President</i> .....	A. L. Huether
<i>Secretary-Treasurer</i> .....	A. E. Effrick
<i>Manager</i> .....	S. W. Archibald
<i>Captain</i> .....	W. A. Dafoe

1919—Intercollegiate Champions.

In order to encourage Association Football on the College campus, the Faculty of the University of Toronto presented a cup, known as the Faculty Cup, to the Inter-College Association Football Club for annual competition among University and affiliated colleges.

### **HOCKEY CLUB OF THE UNIVERSITY OF TORONTO.**

Officers for 1919-1920.

<i>Honorary President</i> .....	Dr. A. B. Wright
<i>President</i> .....	W. A. Dafoe
<i>Vice-President</i> .....	P. F. McIntyre
<i>Manager senior team</i> .....	J. G. Countryman
<i>Captain</i> .....	W. J. Carson
<i>Secretary</i> .....	W. M. Gordon

The trophy which is competed for annually among the Colleges in hockey is known as the Jennings Cup, and is the gift of the late W. T. Jennings, Mem. Inst. C.E.

### **TRACK CLUB.**

Officers for 1920-1921.

<i>Honorary President</i> .....	Dr. W. E. Hooper
<i>President</i> .....	Frank Halbus
<i>Secretary-Treasurer</i> .....	J. E. Buchan
<i>Manager</i> .....	K. L. Carruthers

### **BOXING AND WRESTLING.**

<i>Honorary President</i> .....	Prof. A. T. DeLury
<i>President</i> .....	L. R. Dodds
<i>Secretary-Treasurer</i> .....	J. E. T. Musgrave
<i>Acting Manager</i> .....	C. W. Steele

**FENCING.**

<i>Honorary President</i> .....	Prof. R. E. L. Kittridge
<i>President</i> .....	L. D. Carver
<i>Secretary</i> .....	L. J. Miller

**GYMNASIUM CLUB.**

<i>Honorary President</i> .....	G. A. Keith
<i>President</i> .....	R. D. Huestis
<i>Vice-President</i> .....	R. C. Hays
<i>Secretary and Manager</i> .....	J. B. Ridley

**LACROSSE.**

<i>Honorary President</i> .....	Dr. Frank Park
<i>President</i> .....	W. A. Dafoe
<i>Secretary and Manager</i> .....	Wendell Holmes

**TENNIS.**

<i>Honorary President</i> .....	Prof. Hook
<i>President</i> .....	W. B. Dickson
<i>Secretary</i> .....	D. A. Martin

**SWIMMING.**

<i>Honorary President</i> .....	Dr. Kirkwood
<i>President</i> .....	W. J. Hambly
<i>Secretary-Treasurer</i> .....	J. J. Martin

**HARRIER.**

<i>Honorary President</i> .....	Capt. J. H. Adams
<i>President</i> .....	P. J. Dykes
<i>Secretary and Manager</i> .....	J. Geoghegan

**BASKETBALL CLUB.**

Season 1919-1920.

<i>Honorary President</i> .....	Dr. Clemens
<i>President</i> .....	E. J. L. Coles
<i>Secretary-Treasurer</i> .....	J. A. Dickson

**OFFICERS OF THE 2nd FIELD COMPANY CANADIAN  
ENGINEERS.**

<i>Officer Commanding</i> .....	Major L. L. Anthes.
<i>Captain</i> .....	Valentine Boyd.
<i>Lieutenant (seconded overseas)</i> .....	A. J. S. Davidson.
" " "	E. Pepler.
" " "	L. Drummond.
" " "	E. F. Lynn, M.C.
" " "	F. A. McGivern.
" " "	T. R. Young.
" " "	T. R. Loudon.
" " "	J. B. Heron.
" " "	Hugh Gall.
" " "	T. A. Hyam.
" " "	J. W. Monds.
" " "	R. S. Stone.
" " "	H. P. Frid.
" " "	H. B. Duthie.
" " "	A. L. Mieville.
" " "	L. W. Klingner, M.C.
<i>Medical Officer</i> .....	Major J. W. S. Barton
<i>Chaplain</i> .....	Capt. T. G. Wallace.

**FACULTY OF APPLIED SCIENCE.**

**YOUNG MEN'S CHRISTIAN ASSOCIATION.**

The Y.M.C.A. of the Faculty of Applied Science was organized January 27th, 1905, and forms an integral part of the University of Toronto Y.M.C.A., which is a Federation of the Associations of the various Colleges and Faculties of the University. The object of the Association is to develop a true Christian manhood and to help the students in whatever way possible.

**FACULTY OF APPLIED SCIENCE.**

**VARSITY REPRESENTATIVES**

<i>Senior</i> .....	J. W. Gardner
<i>Junior</i> .....	F. W. Dunton

**UNIVERSITY OF TORONTO C.O.T.C.****Staff.**

<i>Lieut.-Colonel Commanding</i> .....	Colonel W. R. Lang
<i>Major</i> .....	Lt.-Col. A. D. LePan
<i>Major</i> .....	Lt.-Col. C. V. Massey
<i>Adjutant</i> .....	Major G. N. Bramfitt
<i>Quartermaster</i> .....	Lieut. C. H. C. Wright
<i>Paymaster</i> .....	Lieut. T. A. Reed
<i>Medical Officer</i> .....	Major J. W. Barton
<i>Musketry Officer</i> .....	Major F. B. Kenrick

Establishment: 12 Companies and 1 half Company (Graduates).

Note:—Both personnel and establishments are in process of readjustment on a peace basis.

**UNIVERSITY OF TORONTO, STUDENTS' ADMINISTRATIVE  
COUNCIL.**

<i>President Engineering Society</i> .....	R. W. Downie
<i>Fourth Year Representative</i> .....	J. R. McLean
<i>Third Year Representative</i> .....	H. G. Thompson
<i>Second Year Representative</i> .....	H. B. Bell
<i>First Year Representative</i> .....	To be elected

### LODGING AND BOARD.

Accommodation is readily obtainable in numerous private boarding-houses within convenient distance of the University, at a cost of from six dollars a week upwards for comfortable lodging with board; or rooms may be rented at a cost from two dollars and a half per week upwards, and board obtained separately at moderate rates. A list of accredited boarding-houses is kept by the Secretary of the University Young Men's Christian Association, and students are recommended to consult him with reference to the selection of suitable accommodation.

### UNIVERSITY RESIDENCES.

By the generosity of Mr. and Mrs. E. C. Whitney and other friends, the University can now offer to some hundred and fifty men the peculiar advantages of residential life and excellent accommodation within its own grounds. The Residence, opened in November, 1908, consists of three Houses situated on the north side of Hoskin Avenue, opening upon a quadrangle, the fourth side of which is formed by Devonshire Place. They stand about two hundred yards to the north of University College and close to Hart House to which is attached the University Dining Hall. The buildings are known as the South, East and North Houses.

Each House contains twenty-four single rooms, one single suite, one double room and eleven suites, a suite comprising a study and two bedrooms. A large room in each building, with an open hearth and a library has been set aside as a common room. A lavatory with hot and cold shower baths is provided for every eight men. The buildings are heated by steam and lighted by electricity.

The University supplies the table, chairs, book-case, chiffonier, bed, mattress, pillows, linen and window shades for each room; it is prepared to furnish a drop-light for a nominal rental.

Each occupant is charged \$3.00 room-rent per week, payable to the Bursar four weeks in advance. The charge for each single suite is \$4.00 per week. These charges cover heat, light, house-service, house-laundry, and the use of the telephone. There is no separate dining hall connected with the Residence, but board may be obtained at the adjacent University Dining Hall.

Applications for rooms must be made in writing to the Secretary of the Residence Committee (address the Registrar's Office) and must be accompanied by a deposit of \$5.00. This deposit will be returned if the application be not granted, and will be forfeited if a room is assigned to the applicant and not taken by him, unless notice of his refusal of the room

be received by the Secretary in writing before September 8th. It will be returned in full at the end of the College year if the room key be given back and the room and furniture left in a satisfactory condition. The following principles govern the allotment of rooms: (i) No student who, as a result of the annual Spring examinations, is not assured of being able to proceed to a subsequent year, will be admitted into the Residence. Exception to this rule will be made in the case of a student in the Faculty of Medicine who has obtained standing at the May examination, but is debarred by the rules of that Faculty from proceeding to the subsequent year until he has passed his Supplemental examinations. Such a student will be assigned a room provisionally, but cannot occupy it unless he passes his Supplemental examinations in September. (ii) The rooms in each House will be distributed proportionately between the various Faculties and Years. (iii) A limited number of rooms will be reserved for members of the incoming First Year until September 22nd. (iv) Applications will be considered in order of priority.

The University lays down three general rules, designed to prevent hazing, the use of intoxicants and gambling. The students in each House shall elect a House Committee, which is entrusted by the University with the making and enforcing of any other needed rules and with the maintenance of order. A member of the Faculty resides in each House to act as friend and adviser to the men in residence.

**FACULTY OF APPLIED SCIENCE.**  
**REGISTER OF STUDENTS 1919-1920.**

**First Year.**

1	Abernethy, W. W.	Beeton	7	Campbell, T. L.	Elmvale
3	Acres, W. P.	Toronto	1	Campbell, W. H.	Toronto
3	Albertson, R. G.	Niagara Falls	3	Carew, A. W.	Lindsay
7	Allen, S. J.	Aurora	7	Carley, F. C.	Consecon
4	Allward, H. L.	Toronto	6	Carnahan, E. H.	Campbellford
3	Anderson, E. B.	Lindsay	1	Carp, M.	Toronto
2	Anderson, W. S.	Oil Springs	7	Carr, W. H.	Barrie
1	Baird, E. L.	Toronto	1	Carruthers, V. H. H	Foremost, Alta.
1	Baird, E. M.	Scarboro Jct.	6	Carson, C. F.	Oakville
7	Baird, H. P.	Toronto	7	Carson, R. W.	Toronto
6	Baker, H. N.	Toronto	4	Catto, D. E.	Toronto
1	Ball, F. C.	London	7	Catto, J. M.	York Mills
7	Bateman, J. W.	Tweed	7	Chadwick, N. B.	Toronto
7	Beckett, R. W.	Hamilton	2	Chambers, A. J.	Toronto
2	Bedford, H. F.	Toronto	3	Chambers, F. W.	Hamiota, Man.
2	Bedford, P. S.	Toronto	7	Churchill, T. C. D.	Toronto
7	Beecroft, G. W.	Toronto	1	Clappison, H. G.	Hamilton
7	Beger, A. R.	New Hamburg	1	Clarke, J. M. G.	Toronto
6	Begg, E. M.	Toronto	1	Cockburn, L. J.	Pefferlaw
6	Bell, A. A.	Toronto	2	Cockshutt, C. F.	Brantford
7	Bell, H. B.	Georgetown	8	Cohoe, J. E.	Welland
6	Bennett, C. A.	Chesley	7	Colter, J. L.	Petrolea
3	Bennett, W. E.	Ottawa	6	Conklin, A. N.	Toronto
6	Berner, T.	Toronto	1	Conover, J. D.	Brampton
3	Blackburn, R. G.	Regina, Sask.	6	Coulter, H. J.	Windsor
4	Blake, V. B.	Toronto	3	Cowan, E.	Port Arthur
7	Boake, V. E.	Toronto	4	Crawford, A. S.	Hamilton
6	Bonham, L. J.	Dutton	6	Creswick, E. A.	Cookstown
2	Bowyer, C. M.	Simcoe	3	Crowe, G. F.	Truro, N.S.
2	Boyd, O. H.	Toronto	6	Cumberland, D. E.	Toronto
7	Boye, J. G.	Toronto	6	Damm, N. H.	Waterloo
3	Boyes, J. W.	Hamilton	3	Darling, F. L.	Kincardine
3	Boyle, G. E.	Port Colborne	1	Deacon, P. A.	Toronto
7	Breuls, C. P.	Belhaven	1	Diehl, W. M.	Pt. Burwell
4	Brown, F. B.	Toronto	3	Dillon, H. R.	Toronto
6	Brown, F. J.	Humber Bay	7	Doherty, A. H.	Meaford
1	Brown, H. F.	Toronto	1	Drummond, C. H. P.	Toronto
7	Brown, R. J.	Acton	8	Drummond, P. R.	Toronto
7	Browne, J. H.	Haileybury	6	Duffill, W. H.	Toronto
6	Bruce, V. N.	Toronto	2	Dumbrille, J. C.	Kemptville
6	Buchan, J. E.	Sarnia	2	Dunbar, W. R.	Listowel
2	Bull, W. J.	Weston	3	Duncan, F. W.	Toronto
7	Bunting, W. R.	St. Catharines	2	Duncan, G. G.	Toronto
1	Burke, J. P.	Ottawa	2	Dunlop, P. J.	Mackey Sta.
2	Butler, F. J.	Toronto	3	Dyer, J. W.	Goderich
7	Butter, R.	Ancaster	1	Earle, M. D.	St. John, N.B.
3	Button, E. W.	Galt	6	Edwards, P. S.	Buffalo, N.Y.
1	Byram, A. T.	Toronto	7	Elliott, W. F.	Mitchell
7	Cain, L. A.	Toronto	7	Elliott, F. W.	Ingersoll
7	Cameron, G. D. W.	Peterboro	7	Ellis, F. A.	Toronto
6	Campbell, L. S.	Toronto	6	Erwin, R. B.	Waterford

28

98 UNIVERSITY OF TORONTO CALENDAR 1920-1921.

7	Evans, M. G.	Toronto	1	Irwin, K. W.	Oshawa
6	Ewing, C. W.	Toronto	1	Jackson, C. H.	Toronto
3	Fairbairn, R. A.	Toronto	6	Jackson, H. A.	Ilderton
7	Fardoe, H. R.	Hayfield, Man.	7	Jackson, T. W.	Toronto
7	Faris, E. M.	Aurora	7	Jackson, W. C.	Port Perry
7	Farley, J.	Toronto	7	Jaques, C. A.	Woodstock
2	Farncomb, H. F. F.	Trenton	3	Jarrett, G. B.	Toronto
7	Fawcett, W. W.	Hamills Pt.	1	Jennings, W. B.	Sarnia
7	Ferrier, W. G.	Markham	3	Jewett, W. D.	Toronto
7	Fiddes, G. H.	Elmwood	7	Johnson, J. A.	Toronto
7	Finley, R. A.	Meaford	1	Johnson, J. L.	Athens
7	Firth, H. E.	Orangeville	7	Johnson, N. F.	King
6	Fitzgerald, A. M.	Lakefield	7	Johnston, A. M.	St. Catharines
7	Flynn, T. E. J.	Hamilton	7	Johnston, D.	Preston
3	Forster, I. H.	Toronto	3	Johnston, H. H.	Athens
7	Franks, S. T.	Regina, Sask.	2	Johnston, J. G.	Toronto
1	Francis, E. W.	Montreal, Que.	6	Johnston, O. D.	Billing's Bridge
3	Fraser, J. M.	Aurora	7	Jones, H. D. C.	Brantford
2	French, H. E.	Midland	1	Joy, C. B.	Toronto
7	Gardner, L. S.	Windsor	6	Kay, G. F.	Toronto
7	Garrow, K. A. C.	Chesterville	3	Keenleyside, H. B.	London
7	Gillmor, J.	North Bay	1	Keith, W. H.	Newmarket
7	Gillmor, T.	North Bay	3	Kellough, J. Y.	Almonte
7	Givens, H. F.	Beaverton	3	Kelly, F. R.	Lindsay
7	Glave, R. B.	Brantford	6	Kelly, J. E.	Goderich
3	Goldie, J. E.	Guelph	1	Kelly, M. C.	Hamilton
3	Goldie, J. G.	Galt	3	Kennedy, H. L.	Parkhill
6	Graham, H. F.	Owen Sound	3	Kennedy, W. M.	Toronto
1	Graham, H. J.	Brampton	7	Kennedy, W. R.	Toronto
6	Grant, N. S.	Stratford	1	Kenney, W. E.	Pt. Maitland
7	Gray, A. S.	Toronto	7	Kent, W. H.	Hamilton
2	Gray, K. C.	Coldwater	6	Kesteven-Balshaw, H.	Birchcliff
6	Greey, S. M.	Toronto	6	King, L. Y.	Simcoe
1	Griesbach, R. J.	Collingwood	6	Kinsman, D. A.	Toronto
2	Griffin, K.	Toronto	3	Kischel, G. H.	Toronto
7	Guenther, W. F.	Brantford	6	Kramer, H. O.	Humberstone
6	Hamilton, K. C.	Galt	2	Laird, R. G.	Seaforth
3	Hanning, J. R.	Preston	2	Lang, H. O.	Toronto
3	Hardie, D. B.	Esquimalt, B.C.	7	Lappin, W. D.	Toronto
6	Harston, J. C.	Toronto	7	Laurie, R. M.	Toronto
7	Hawkins, R. M.	Hay	7	Laurie, W. L.	Agincourt
6	Hayes, P. D.	Toronto	7	Lawrence, R.	Toronto
1	Hayman, H. L.	Toronto	4	Lawson, A. W. P.	Leaside
7	Hayward, A. E.	Toronto	7	Lawton, F. L.	Toronto
1	Hazel, H. F.	Hamilton	1	Learoyd, E. S.	Kleinberg
7	Henderson, J. G.	Troy	6	Lebeau, A. M.	Calgary, Alta.
7	Hepburn, D.	Milton	1	Leslie, R. C.	Toronto
6	Hewgill, R.	Toronto	1	Lewis, C. A.	Toronto
1	Higbee, J. C.	Toronto	3	Lindsay, G. E.	Toronto
7	Hitchon, L. E.	Brantford	6	Lindsay, T.	Weston
7	Hornell, D. R.	Toronto	2	Logan, H. J.	Dunnville
4	Howard, E. F.	Toronto	1	Lonergan, A. H.	Peterboro
3	Hueston, R. M.	Ingersoll	3	Longworthy, W. O.	Regina, Sask.
2	Huggins, F. W.	Toronto	6	Low, R. S.	Toronto
7	Ickler, C. H.	Chesley	7	Lowry, C. A.	Bridgeburg
7	Inglis, J. G.	Atwood	1	Lucas, C. H.	Toronto
8	Ironside, J. G.	Simcoe	2	Lyle, F. J.	Brantford

X 43

2	Lyle, V. B.	Peterboro
1	Lyons, R. T.	Toronto
1	McAllister, D. G.	Hamilton
6	McBride, E. W.	Toronto
7	McBroom, H. E.	Toronto
6	McBurney, W. G.	Niagara Falls
7	McCabe, R. H.	Tottenham
6	McClellan, G. E.	Medicine Hat, Alta.
3	McCrae, G. W.	Lindsay
3	McCulloch, H. L.	Galt
1	McIntosh, D. N.	Simcoe
6	McIntosh, J. H.	Victoria, B.C.
4	McIntyre, H. A.	Toronto
1	McIntyre, V. H.	Toronto
7	McKay, H. A.	Seaforth
3	McKee, J. W.	Toronto
7	McKenzie, H. B.	Toronto
1	McLelland, W. J.	Hamilton
3	McMahon, T. J.	Newcastle
6	McManus, H. W.	Maitland
2	McMaster, J. A.	Toronto
6	McMillan, R. J.	Stratford
3	McMullen, A. R.	Toronto
8	McMurrich, J. R.	Toronto
6	McPhail, A. L.	Galt
7	McQueen, A. W. F.	Nottawa
6	McQueen, M. V.	Toronto
6	MacBeth, D.	St. John, N.B.
6	MacDougall, H. A.	Toronto
3	MacKendrick, D. E.	Toronto
3	MacKendrick, J. N.	Galt
1	Mackenzie, W. J.	Port Robinson
3	Macklin, W. H.	Millikin
7	MacLellan, J.	Claremont
3	MacLeod, M. P.	Toronto
6	Maedel, H. C.	Norwich
4	Magee, J. G.	London
3	Magill, J. J.	Brampton
1	Maguire, W. S.	Toronto
1	Martin, G. A.	Toronto
7	Martyn, E. R.	Ripley
3	Mason, H. R.	Toronto
3	Mavor, W.	Toronto
1	Maynes, C. A.	Toronto
7	Meikle, M.	Midland
1	Menendez, C. G.	Nassau, Bahamas
6	Meredith, H. J.	Vancouver, B.C.
7	Miller, W. L.	Lawrence Station
7	Miller, W. H.	Galt
7	Millikin, G. I.	Midland
7	Mills, C. A.	Orangeville
7	Monkman, F. C.	Brampton
7	Moon, G. D.	Port Hope
6	Moran, H. F.	Codrington
7	Morris, H. M.	Petrolia
6	Morris, R. V.	Long Branch
7	Morrish, J. S.	Highland Creek
2	Morrison, R. G. K.	Edmonton, Alta.
2	Morton, C. O.	Toronto
7	Morwick, E.	Jerseyville
1	Moss, F. W.	Preston
3	Mowat, B. H.	Toronto
4	Mueller, T. G.	Toronto
6	Murphy, G. H.	New York, N.Y
7	Murphy, A. S. F.	Wardsville
6	Murray, A.	Costa Rica, Central America
3	Murray, J. R.	Toronto
1	Murtha, L. J.	Lindsay
6	Mutch, G. C.	Toronto
7	Nablo, H. W.	Cayuga
7	Nahrgang, A. R.	New Hamburg
7	Nattress, D. I.	Sault Ste. Marie
2	Nethercott, F. A.	Stratford
1	Nettleton, C. A.	Toronto
7	Nicol, K. T.	Aurora
6	Norman, R. E.	Toronto
1	Norris, C. A.	Toronto
4	Oldford, R.	Musgravetown, Nfld.
6	Oliver, C. W.	Belton
6	O'Shaughnessy, T. J.	Cobalt
7	Paget, J. A.	Huntsville
6	Parrett, A. E. J.	Toronto
6	Parrett, R. E.	Toronto
3	Paterson, W. L.	Sarnia
4	Paul, R. C.	Listowel
6	Petry, H. H.	Port Hope
7	Pickering, E. R.	Zephyr
1	Pinnell, F. H. A.	Brantford
1	Plewes, R. V.	London
7	Porter, W. J.	Powassan
3	Potvin, L. J.	Ottawa
1	Pratt, A. O.	Ottawa
6	Price, L. M.	St. Thomas
7	Price, A. V.	Toronto
6	Pritchard, H. S.	Harriston
3	Purvis, W. F.	Toronto
1	Ramsay, A. M.	Toronto
7	Ratz, H. W.	New Hamburg
1	Reid, A. M.	Toronto
6	Relyea, R. C.	Cornwall
3	Ritchie, H. S.	Toronto
6	Robertson, G. H.	Toronto
6	Robertson, H. F.	Brantford
2	Robson, W. T.	Toronto
7	Rogers, E. S.	Toronto
3	Rolph, E. G.	Toronto
7	Romm, N.	Toronto
4	Ross, D. M. M.	Toronto
7	Rossiter, R. E.	Sault Ste. Marie

18

20

2	Ruby, E. A.	Kitchener	7	Thomson, G. A.	Agincourt
7	Rundle, W. L.	Dundalk	7	Thomson, G. A.	Toronto
3	Russell, W. J.	Unionville	7	Thomson, J. M.	Hawkesbury
1	Sabiston, G. P.	Owen Sound	3	Timmins, W. W.	Toronto
1	Sanders, F. W.	Stouffville	6	Tofflemire, R. H.	Windsor
7	Saunders, C. F. J.	Burford	7	Tomlinson, G. K.	Toronto
3	Schinbein, E. E.	Conestogo	2	Tomlinson, F. C.	Langstaff
1	Schultz, F. H.	Brantford	6	Turner, J. W.	Craighurst
7	Scott, F. A.	Orangeville	6	Upper, F. A.	Niagara Falls
7	Scott, G. D.	Claremont	1	Vanderburgh, W. A.	
6	Seaborne, F. S.	Toronto			Richmond Hill
4	Seeli, E. S.	Lucan	6	Van Dusen, F. H.	Toronto
6	Shaffer, B.	Ft. William	6	Veals, R. C.	Toronto
7	Sharp, R. A.	Sudbury	7	Vernon, A.	Toronto
6	Shortt, W. J.	Toronto	1	Vincent, R. N.	Parry Sound
1	Siddall, K. C.	Islington	6	Wade, C. A. G.	Grimsby
3	Simson, F. T.	Toronto	3	Wagner, J. F.	Kitchener
6	Sitzer, I. K.	Milton	7	Walker, S. W.	Streetsville
7	Slater, J. H.	London	1	Walker, W. H.	Stratford
1	Smith, G. W.	Weston	1	Walks, J. D.	Chesley
1	Smith, H. D.	Ottawa	6	Ward, N. F.	Hamilton
7	Smith, J. D.	Port Hope	6	Warren, A. R.	Hespeler
1	Smith, J. M.	Durham	3	Wells, C. M.	Toronto
6	Smye, G. R.	Galt	1	Welsh, D. T.	Hamilton
7	Snow, R. B. L.	Juddhaven	2	Wheatley, W. P.	Toronto
6	Snyder, A. L.	Toronto	7	White, W. A.	Toronto
4	Sproatt, C. B.	Toronto	3	Whiteside, J.	Little Britain
7	Stevens, E. C.	Toronto	3	Wilford, J. R.	Lindsay
3	Stevenson, H. J.	Toronto	7	Wilkinson, G. I.	Wallenstein
1	Stewart, H. E.	Toronto	6	Williams, B. I.	London
7	Stewart, W. D.	Toronto	2	Williams, C. S.	Toronto
1	Stokes, F.	Sombra	8	Williams, R. K.	Toronto
6	Stoll, W. H.	Nottawa	1	Williams, W. F.	Markham
7	Story, R. A.	Claremont	3	Wingfield, H. E.	Dunnville
3	Stott, F. W.	St. Thomas	7	Wolsey, M.	Toronto
3	Strudley, D. B.	Stratford	7	Wright, W. E.	Cadogan, Alta.
6	Stuart, A. F.	Ottawa	2	Wylie, J. M.	Blenheim
7	Sullivan, F. G.	Toronto	6	Zadnoff, M.	Toronto
7	Thompson, J. E.	Thessalon			xv v3

**Second Year.**

3	Ahara, E. V.	Toronto	7	Burns, D.	Brantford
1	Anderson, A. M.	Toronto	3	Bysshe, H. A.	Greenfield, Mass.
1	Archibald, S. W.	Seaforth	6	Campbell, W. A.	Toronto
3	Armstrong, E. F.	Iroquois	1	Carruthers, K. L.	Toronto
1	Ashcroft, C. C.	York Mills	6	Carslake, C. H.	Toronto
1	Aykroyd, G. C.	Toronto	6	Chandler, H. M.	Mt. Dennis
7	Barbour, Miss J. E.	Meaford	1	Chater, W. N.	Toronto
7	Benson, W. R.	Toronto	1	Clairmont, W. L.	Gravenhurst
6	Best, G. C.	Brussels	2	Clarke, A. R.	Toronto
7	Bishop, W. V.	Kimberley	1	Clarke, T.	Toronto
3	Black, W. G.	Airdrie, Alta.	1	Cockerline, E. W.	Toronto
6	Bongard, G. R.	Toronto	7	Coles, F. B.	Brantford
6	Breithaupt, C. L.	Kitchener	2	Coo, C. W. H.	Toronto
6	Broughall, G. M.	Toronto	1	Cook, R. H. B.	Aurora
7	Bryant, G. F.	Midland	7	Coulter, S. L.	Windsor
2	Brown, E. L.	Toronto	6	Crawford, J. J.	Toronto

1	Cunningham, L. G.	Toronto	7	Lidkea, H. J.	North Bay
6	Day, G. A.	Guelph	6	Lindsay, A.	Dover Centre
6	Dignam, H. M.	Toronto	1	Little, A. M.	Toronto
6	Dilworth, H. M.	Toronto	3	MacAllister, J. S. E.	Toronto
3	Doran, J. Y.	Toronto	1	Macqueen, C. B.	Toronto
1	Dougall, C. H.	Hamilton	2	Mackle, W. P.	Toronto
2	Drybrough, J.	Sudbury	8	Mallett, G. S.	Toronto
2	Duggan, S. F.	Schomberg	6	Marks, G. R.	Toronto
3	Dunbar, P. G.	St. Thomas	7	Mayberry, J. S.	Stratford
7	Duncan, W. C. C.	Toronto	8	Mellish, A. H.	Brantford
3	Elliott, W. B.	St. Catharines	1	Metcalfe, W. F.	Hamilton
3	Evans, G. F.	Bradford	6	Meyer, H. B.	Brantford
3	Evans, M. M.	Bradford	7	Miller, B. H.	Stouffville
6	Everest, T. E.	Toronto	7	Milne, J. W.	Belleville
3	Everson, S. F.	Oshawa	7	Montemurro, M. M.	North Bay
6	Fair, A. E. H.	Midland	6	Moor, H. H.	Toronto
7	Fenwick, J. R.	Toronto	6	Mueller, H. H.	Toronto
7	Fitzgerald, W. W.	Toronto	3	Mummery, C. R.	Hamilton
1	Foley, W. J.	Ottawa	3	Murphy, A. R.	Wardsville
6	Fotheringham, D. T.	Toronto	1	McClintock, G. A.,	
1	Fry, C. N.	Chesley			St. Andrew's, East, Que.
7	Fuller, G. B.	Arkona	1	McGrath, R. J.	St. Catharines
1	Gibbs, J. W. S.	Kincardine	6	McKeown, C. J. W.	Mono Road
1	Glover, T. S.	Hessle, England	6	McLaughlin, R. R.	Toronto
7	Goodwin, J. E.	Toronto	6	McLean, B. M.	London
6	Grant, W. J.	Toronto	7	McLean, G. E.	Thornbury
7	Graves, H. P.	London	1	McMurtry, L. C.	London
6	Gray, F. M.	Toronto	2	McNiven, J. G.	Acton
3	Greig, A. K.	Toronto	1	Nash, A. L. S.	Dunnville
1	Guscott, A. G.	Toronto	4	Norcross, M. A.	Lennoxville, Que.
6	Haldenby, C. N.	Toronto	4	Noxon, K. F.	Toronto
6	Hamilton, C.	Toronto	2	Oaks, H. A.	Preston
3	Harlow, G. H.	Toronto	3	Park, R.	Hamilton
1	Hawkins, W. J. H.	Islington	6	Parker, R. E.	Tavistock
1	Hayman, H. G.	Toronto	6	Parker, R. R.	Stirling
6	Heatley, A. H.	Brampton	2	Parsons, C. S.	Toronto
2	Heisey, K. B.	Markham	2	Paul, R. J.	Sunderland
3	Helliwell, A. L.	Toronto	3	Pearce, W. R.	Toronto
4	Helme, J. B.	Smith's Falls	6	Pearen, C. B.	Toronto
7	Henry, S. W.	Stratford	2	Perry, J. C.	Uxbridge
2	Henry, R. J.	Grimsby	7	Philip, E. B.	Toronto
2	Horning, A. G.	Toronto	3	Philp, H. J.	Nestleton
7	Howden, H. E.	Caledonia	1	Pollock, F. J.	Almonte
3	Hume, A. G.	Toronto	1	Powell, H. R.	Grenfell, Sask.
6	Johnson, A.	Orillia	3	Powell, M. V.	Peterboro
7	Johnston, B. H.	Toronto	1	Pratt, D. L.	Midland
7	Johnston, J. W.	Uxbridge	1	Ramsay, W. B.	Lumsden, Sask.
6	Kay, J. A. C.	Stratford	1	Reid, G. G.	Toronto
3	Kerr, H. H.	Seaforth	6	Reynolds, H.	Toronto
3	Kirkconnell, H. R.	Lindsay	1	Reynolds, W. M.	Aurora
3	Kirkconnell, J. R.	Lindsay	6	Richardson, W. R.	Essex
3	Kischel, F. W.	Toronto	8	Robertson, W. G.	Palmerston
7	Langford, J. A.	Calgary, Alta.	2	Robinson, L. J.	Toronto
1	Langlois, W. L.	Toronto	7	Rosebrugh, D. W.	Toronto
2	La Ronde, H.	Toronto	7	Ross, M. D.	Chatham
7	Lawson, A. J.	Hespeler	3	Sanderson, A. C.	Toronto
2	Lawson, H. H.	Toronto	7	Scadding, S. C.	Toronto

6	Schemnitz, D. A.	Toronto
7	Scott, R. K.	Pakenham
6	Sherk, W. S.	Sherkston
7	Smillie, S. S.	Toronto
6	Spence, F. S.	Toronto
7	Spotton, J. G.	Harriston
6	Stalker, C. H.	Toronto
1	Stewart, M. D.	Toronto
3	Stewart, V.	Milestone, Sask.
1	Stratford, A. H.	Toronto
3	Stuart, G. L.	Toronto
7	Tomlinson, J. F.	Toronto
3	Thompson, H. G.	Belmont
7	Thompson, R. J.	Toronto

**Third Year.**

6	Affleck, J. K.	North Bay
1	Angus, J. C.	Toronto
1	Augustine, W. P.	Port Colborne
6	Barry, T. M.	Hamilton
2	Beck, C. M.	Penetanguishene
5	Bell, J. C.	Seaforth
3	Blue, A. C.	Wallacetown
3	Booth, G. E.	Toronto
1	Bowman, N.	Kitchener
7	Brace, G. A.	Brockville
1	Breen, J. M.	Long Branch
3	Brickenden, W. T.	Toronto
6	Brody, D.	Toronto
1	Bufton, H. R.	Toronto
3	Chaikoff, S.	Toronto
5	Churchill, J. W.	Toronto
1	Coulter, W. D.	Port Robinson
2	Craigie, D. E.	Toronto
3	Crane, H. C.	Toronto
1	Culliton, P. J.	Stratford
3	Dickenson, M. E.	Hamilton
7	Doherty, W. A.	Toronto
2	Doner, G. B.	Stayner
5	Downey, F. P.	Northwood
1	Downie, R. W.	Toronto
3	Dunn, E. A.	Chatham
3	Dunton, F. W.	Brampton
7	Durbrow, P. A.	Renfrew
3	Eckert, F. R.	London
7	Eley, F. C.	Toronto
5	Elliott, C. R.	Toronto
1	Elliott, H. J.	Toronto
6	Emory, V. H.	Toronto
5	Fair, H. A.	Toronto
5	Fasken, J. E.	Kippen
2	Fawcett, T. C.	Gravenhurst
1	Ferris, C. B.	Toronto
5	File, R. R.	Toronto
7	Flynn, J. P.	Merritton
5	Fraser, A. D. R.	Toronto
3	Galbraith, L.	Macleod, Alta.
2	Thorpe, G. M.	Toronto
6	Wass, F. L.	St. Mary's
7	Weldon, H. S.	Oakwood
1	West, J. A.	Simcoe
6	Westren, J. H.	Toronto
7	White, R. E.	Hamilton
3	Wilford, H. D.	Lindsay
1	Williams, R. H.	Burlington
7	Williamson, R. J.	Toronto
6	Winter, L. A. G.	Toronto
3	Woelfle, E. J.	Chesley
6	Wynne-Roberts, R. I.	Toronto
7	Yack, W. L.	Walkerton
1	Zealand, E. L.	Hamilton

1 Meader, J. C.	Toronto
1 Mitchell, J. C.	London
1 Monteith, J. C.	Stratford
7 Murphy, C. J.	London
7 McClelland, J. P.	Arthur
3 McDonald, F. R.	Toronto
1 McGee, G. L.	Toronto
8 McIntyre, P. F.	Perth
1 McLean, J. R.	Toronto
7 McLellan, J. D.	Toronto
3 McNaughton, L. T.	London
4 Niece, H. P.	Preston
1 Nixon, W. H.	Toronto
2 O'Brien, A. E.	Toronto
1 Parker, W. J.	Toronto
1 Pepler, S. H.	Toronto
6 Phillips, J. F.	Toronto
1 Pinel, W. G.	Toronto
7 Playfair, L. I.	Lanark
7 Prendergast, R. M.	Toronto
5 Presgrave, R.	Toronto
7 Preston, H. E.	Midland
1 Proctor, W. D.	Sarnia
2 Purdy, H. E.	Port Perry
7 Ratcliff, J. H.	Stouffville
1 Rayner, G. V.	Hamilton
3 Relyea, J. D.	Prescott
1 Richardson, F. C.	Toronto
2 Rolph, E. A.	Toronto
5 Sale, C. P.	Toronto
6 Schierholtz, O. J.	Elmira
8 Shepard, H. M.	Hamilton
7 Shephard, G. R.	Toronto
3 Shortt, J. E. B.	Toronto
3 Simmers, J. A.	Toronto
2 Simpson, F. W.	Thornhill
7 Smith, W. M.	Brantford
1 Smith, C. T.	St. Thomas
3 Spencer, H. S.	Picton
3 Stafford, M. C.	Toronto
7 Stalker, W. D.	Simcoe
1 Steel, G. E.	Toronto
1 Taylor, F. H.	Toronto
3 Tindale, C. E.	Chatsworth
7 Tracy, G. F.	Toronto
1 Vardon, L. M.	Toronto
3 Voaden, V.	St. Thomas
1 Wadell, F. M.	Brantford
7 Wallace, J. S. M.	Galt
7 Ward, J. W.	Simcoe
1 Warwick, R. S.	Brussels
5 Weelands, J. E.	Owen Sound
3 West, T. M.	Toronto
7 Wilson, A. S.	Woodstock
4 Wilson, W. S.	Owen Sound
1 Wimperly, C. C.	Oakville
6 Wingfield, A. H.	Hamilton
4 Wright, B. H.	Toronto
2 Wyllie, W. J. E.	Kamloops, B.C.
2 Young, J. F.	Toronto
4 Young, T. J.	Toronto

**Fourth Year.**

1 Armstrong, C. G. R.	Merlin
1 Ball, O. V.	Toronto
7 Barbour, R. A.	Toronto
1 Bennett, G. C.	Midland
1 Birdsall, E.	Toronto
7 Booth, F. W.	Toronto
1 Burn, G. A. H.	Janetville
7 Burton, C. E.	Warwick
1 Cavana, E. L.	Orillia
3 Centner, M. H.	Toronto
3 Chambers, J. L.	St. Mary's
7 Cheney, S. K.	Vankleek Hill
6 Cody, H. B.	Hamilton
1 Coon, H. F.	Hamilton
5 Corman, H. E.	Caledonia
1 Crosby, E.	Toronto
1 Crysler, R. A.	Toronto
1 Dafoe, E. R.	Napanee
1 Dale, W. P.	Brampton
7 Dancey, W. A.	Goderich
7 Daniel, T. A.	Ingersoll
6 Dingman, A. H.	Toronto
1 Dustan, E. B.	Pictou, N.S
6 Faill, J.	Stratford
7 Forster, C.	Kingsville
2 Gilley, E. R.	New Westminster, B.C.
2 Graham, C. W.	Edmonton, Alta.
5 Hambleton, A.	Toronto
7 Hardie, R. C.	Esquimalt, B.C.
1 Harman, W.	Zephyr
1 Harrison, R.	Birch Cliff
3 Henderson, M. G.	Tara
7 Hill, C. R.	Weston
4 Hill, Miss E. M.	Edmonton, Alta.
3 Holland, U. C.	London
7 Huestis, R. D.	Toronto
1 Hughes, C. A.	Mimico Beach
8 Hugill, O. H.	Sault Ste. Marie
1 Hunter, W. H.	Toronto
4 Husband, L. B.	Hamilton
7 Illman, N. H.	Chatham
1 Irvin, W. F.	Toronto
7 Jenkins, C. F.	Thamesford
1 Johnston, E. W.	Harriston
1 Julian, F. T.	Malton
7 Kelleher, J.	Goderich

6	Kerman, H. C.	Toronto	1	Shoebottom, L. R.	London
4	Kidd, W. S.	Burritt's Rapids	2	Skinner, J. C. E.	Barrie
7	Little, H. B.	New Westminster, B.C.	1	Smythe, C.	Toronto
3	McCreery, H. J.	Vancouver, B.C.	6	Soehner, H. C.	Stratford
1	McEachern, K. J.	Alvinston	1	Stephenson, G. E.	Varna
7	McNamara, C. J.	Port Colborne	7	Stewart, A. L.	Kirkton
3	Macpherson, G. L.	Toronto	1	Storms, D. H.	Hamilton
7	Manning, T. R.	Toronto	7	Turnbull, A. G.	Galt
3	Merry, F. S.	Marchmont	1	Ure, D. G.	Woodstock
7	Mitchell, M. H.	Oshawa	3	Vaughan, O. D.	Toronto
1	Moorhouse, E. J.	<i>378 Helen Ave. Detroit, Mich.</i>	1	Wait, G. E.	Ottawa
		Medicine Hat, Alta.	3	Washington, H. A.	Toronto
5	Musgrave, J. E. T.	Toronto	4	Waters, D. M.	Toronto
7	Nichol, W. J.	Dunnville	5	Watson, L. T.	Woodstock
3	O'Flaherty, J. G.	London	3	Watson, J. M.	Woodstock
7	Panter, J. S.	Belleville	3	Weicker, J. J.	Tavistock
1	Paterson, E. L.	Blantyre	3	Weir, M. L.	Toronto
7	Pullan, E.	Toronto	✓	Welsman, T. S.	Toronto
2	Richardson, C. A.	E. Cleveland, Ohio	1	Whaley, A. B.	Toronto
1	Riehl, W. H.	Stratford	2	Wilcock, W. S.	Flesherton
1	Ritchie, W. W.	Vancouver, B.C.	1	Willmott, L. E.	Toronto
1	Ryan, T. J. L.	Brantford	7	Wilson, A. E.	Port Perry
1	Salisbury, E. A.	Toronto	3	Wilson, J. S.	Kenora

**Occasional.**

Ord, S. A. .... Guelph

### STUDENTS OF OTHER FACULTIES TAKING INSTRUCTION IN ASSAYING, SURVEYING, ETC.

Dippell, L. W.	Walkerton
Downer, L. W.	Egbert
Quinn, Miss E. L.	Kincardine
Warren, P. S.	Brechin

**Summary.**

First Year Students	401
Second Year Students	172
Third Year Students	140
Fourth Year Students	93
Students of Other Faculties	4
Occasional	1

**Scholarship.**

Awarded by the Boiler Inspection and Insurance Co. of Canada for General Proficiency in the Third Year in Mechanical Engineering.

1912. A. S. Anderson	1917. W. D. Robertson
1913. E. D. W. Courtice	1918. T. W. Campbell
1914. C. G. Davey	1919. J. L. Chambers and
1915. L. L. Youell	M. L. Weir
1916. A. M. Snider	

**Degree of Master of Applied Science (M.A.Sc.).**

1915. Avery, C. R.	1915. Parkinson, N. F.
1916. Dobson, W. P.	1915. Robertson, C. S.
1914. Murdie, W. C.	1915. Rolfsen, O.
1916. Parker, G. C.	1915. Treloar, G. E.

**PROFESSIONAL DEGREES AWARDED SINCE 1910.****Degree of Civil Engineer (C.E.).**

1915. Bennett, G. A.	1919. Robinson, L. H.
1915. Challies, J. B.	1915. Smith, A.
1913. Dallyn, F. A.	1917. Smith, W. C.
1915. Davison, A. E.	1915. Stayner, D. S.
1914. Gillespie, P.	1918. Sutherland, C. C.
1914. Hill, S. N.	1911. Swan, W. G.
1914. Hogg, T. H.	1917. Taylor, Thos.
1913. James, E. A.	1917. Townsend, C. J.
1916. Johnston, C.	1919. Traill, J. J.
1916. Johnston, J. T.	1916. Watson, M. B.
1913. Marrs, C. H.	1914. Young, C. R.
1919. Parker, G. C.	1919. Young, R. B.

**Degree of Mining Engineer (M.E.).**

1912. Burwash, L. T.	1910. McMillan, J. G.
1915. Campbell, A. D.	1915. Neilly, B.
1913. Forbes, D. L. H.	

1920 Hamilton C.B.

**Degree of Mechanical Engineer (M.E.).**

1916. Acres, H. G.	1913. Manson, G. J.
1915. Campbell, A. M.	1919. Parkin, J. H.
1913. Christie, A. G.	1913. Smart, R. S.
1913. Darling, E. H.	1918. Watson, M. B.

**Degree of Electrical Engineer (E.E.).**

1913. Mitchell, P. H.	1914. Sara, R. A.
1915. Palmer, C. E.	

1920 Clark G.T.

### GRADUATES.

Graduates are requested to inform the Secretary of changes in their addresses.

Graduating departments are represented as follows:

1. Civil Engineering.
2. Mining.
3. Mechanical.
4. Architecture.
5. Analytical and Applied Chemistry.
6. Chemical Engineering.
7. Electrical.
8. Metallurgical.

Up to and including 1911, three represented the combined departments of Mechanical and Electrical Engineering.

#### 1881.

1. J. L. MORRIS, C.E., O.L.S.,  
*Private Practice as Civil Engineer.* Pembroke, Ont.

#### 1882.

1. D. JEFFREY,  
*Contractor.* Windsor, Missouri
1. J. H. KENNEDY, C.E., O.L.S.,  
*Chief Engineer, Vancouver, Victoria and Eastern Ry.* Vancouver, B.C.
1. J. McAREE, B.A.Sc., D.T.S. (deceased).

#### 1883.

1. D. BURNS, O.L.S., A.M.E.I.C. (deceased).
1. G. H. DUGGAN, M.E.I.C.,  
*Vice-President and Chief Engineer, Dominion Bridge Co., Ltd.* Lachine, Que.
1. J. W. TYRRELL, C.E., D.L.S., O.L.S., M.E.I.C.,  
*J. W. Tyrrell & Co.* Hamilton, Ont.

#### 1884.

1. W. C. KIRKLAND (deceased).
1. J. McDougall, B.A. (deceased).
1. A. R. RAYMER,  
*Assistant Chief Engineer, P. & L. E. Ry.* Pittsburgh, Pa.
1. JAMES ROBERTSON, O.L.S.,  
*Commissioner, The Canada Co.* 531 Palmerston Ave., Toronto, Ont.
1. E. W. STERN, M. Am. Soc. C.E.,  
*Consulting Engineer.* 56 West 45th St., New York, N.Y.

#### 1885.

1. J. F. BLEAKLEY,  
*Civil Engineer.* Bowmanville, Ont.
1. H. J. BOWMAN, D. & O.L.S., M.E.I.C., (Deceased)
1. E. E. HENDERSON, O.L.S.,  
*Civil Engineer.* Henderson P.O., Me.
1. B. A. LUDGATE, O.L.S.,  
*Assistant Engineer, P. & L. E. Ry.* Pittsburgh, Pa.
1. O. MCKAY, O.L.S.,  
*Civil Engineer and Surveyor.* Walkerville, Ont.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 107

1886.

1. A. M. BOWMAN, D.L.S.,  
*Pennsylvania Contracting Co.* Pittsburgh, Pa.
1. E. B. HERMON, D. & O.L.S.,  
*Assistant Engineer, Vancouver Power Co.* Vancouver, B.C.
1. ROBERT LAIRD, O.L.S.,  
*Laird & Routley, Engineers and Surveyors.* Haileybury, Ont.
1. T. KENNARD THOMSON, D.Sc., C.E., M.E.I.C., M.Am.Soc. C.E.,  
*Consulting Engineer.* Hudson Terminal Building, New York
1. H. G. TYRELL, C.E., A.M.E.I.C.,  
*Consulting Engineer.* 817 Hinman Ave., Evanston, Ill.

1887.

1. J. C. BURNS (deceased).
1. A. E. LOTT,  
*Consulting Railway Engineer.* Los Angeles, Cal.
1. A. L. McCULLOUGH, O.L.S., B.C.L.S., A.M.E.I.C.,  
*Engineer and Surveyor.* Nelson, B.C.
1. F. MARTIN, M.B., O.L.S.,  
*Physician.*
1. C. H. PINHEY, D. & O.L.S., 110 Wellington St., Ottawa, Ont.
1. J. ROGERS, O.L.S.,  
*Town Engineer.* Mitchell, Ont.

1888.

1. J. F. APSEY, O.L.S., 3 N. Calvert St., Baltimore, Md.  
*Assistant Division Engineer, Baltimore Sewerage Commission.*
1. W. T. ASHBRIDGE, C.E.,  
*Engineer and Surveyor.* Toronto, Ont.
1. EDWARD F. BALL, A.M.E.I.C., 335 Madison Ave., New York, N.Y.  
*Chief Assistant Engineer of Resurveys, Land and Tax Department, N.Y. Central and Hudson River Railroad.*
1. D. B. BROWN, O.L.S.,  
*Locating Engineer, Transcontinental Ry. (G.T.P.)* Quebec, P.Q.
1. C. M. CANNIFF,  
*Department of Soldiers' Civil Re-establishment.* Toronto, Ont.
1. H. J. CHEWETT, B.A.Sc., C.E., A.M.E.I.C.,  
Cold Ash, Newbury, England
1. J. GIBBONS, D. & O.L.S.,  
*Surveying Staff, Department of Interior.* Ottawa, Ont.
1. R. McDOWALL, O.L.S., C.E., A.M.E.I.C.,  
*Town Engineer.* Owen Sound, Ont.
1. G. W. MCFARLEN, O.L.S.,  
*City Engineer's Staff.* Toronto, Ont.
1. C. J. MARANI,  
*Designing and Consulting Structural Engineer for the Russia Cement Co.* Anacortes, Wash.
1. G. R. MICKLE, B. A.,  
*Mine Assessor, Province of Ontario.* Toronto, Ont.
1. J. H. MOORE, O.L.S.,  
*Town Engineer.* Smith's Falls, Ont.
1. G. H. RICHARDSON.
1. K. ROSE,  
*Manager, Evans Rotary Engine Co. of Canada.* Curry Bldg., Toronto, Ont.
1. J. E. ROSS, D. & O.L.S.,  
*Surveying Staff, Department of Interior.* Kamloops, B.C.
1. C. H. C. WRIGHT, B.A.Sc.,  
*Professor of Architecture, University of Toronto.* Toronto, Ont.

## 1889.

1. B. CAREY, Toronto, Ont.  
 1. W. J. CHALMERS, Vanport, Beaver Co., Pa.  
 1. W. A. CLEMENT, M.E.I.C., South Vancouver, B.C.  
*Municipal Engineer.*  
 1. G. F. HANNING, Toronto, Ont.  
*Hydro Electric Power Commission.*  
 1. H. E. T. HAULTAIN, C.E., Asso. Mem., I.C.E., M.I.M.M., M.E.I.C.,  
*Professor of Mining Engineering, University of Toronto.* Toronto, Ont.  
 1. J. IRVINE (deceased).  
 1. D. D. JAMES, B.A., B.A.Sc., 693 Shaw St., Toronto, Ont.  
*Surveyor.*  
 1. F. X. MILL (deceased).  
 1. H. K. MOBERLEY, D. & S.L.S., Yorkton, Sask.  
*District Engineer and Surveyor.*  
 1. T. R. ROSEBRUGH, M. A.,  
*Professor of Electrical Engineering, University of Toronto.* Toronto, Ont.  
 1. T. WICKETT, M.D., 25 Nightingale St., Hamilton, Ont.  
*Physician.*

## 1890.

5. W. E. BOUSTEAD (deceased).  
 1. F. M. BOWMAN, O.L.S., C.E., Pittsburgh, Pa.  
*Blaw Steel Const. Co.*  
 1. M. A. BUCKE, M.E. (deceased).  
 1. G. D. CORRIGAN (deceased).  
 1. J. A. DUFF, B.A. (deceased).  
 1. A. B. ENGLISH (deceased).  
 1. N. L. GARLAND, 76 Wellington St. W., Toronto, Ont.  
 1. J. HUTCHEON, O.L.S., Parliament Bldgs., Toronto, Ont.  
*Dept. of Lands, Forests and Mines.*  
 1. W. L. INNES, O.L.S., Simcoe, Ont.  
*Manager, Dominion Canners, Ltd.*  
 1. E. B. MERRILL, B.A., B.A.Sc., M.E.I.C., M. Am. Inst. E.E.,  
*Engineer, Hydro Electric Power Commission.*  
 1. J. R. PEDDER (deceased).  
 3. R. A. ROSS, E.E., 80 St. Francois Xavier St., Montreal, Que.  
*Consulting Electrical and Mechanical Engineer.*  
 1. T. H. WIGGINS, O.L.S., Saskatoon, Sask.  
*Civil Engineer and Dom. Land Surveyor.*  
 1. W. J. WITHROW (died while on Active Service, 1917).

## 1891.

1. H. J. BEATTY, O.L.S., Pembroke, Ont.  
*Engineer and Surveyor.*  
 1. T. R. DEACON, O.L.S., M.E.I.C., Winnipeg, Man.  
*President and General Manager, Manitoba Bridge & Iron Works, Ltd.*  
 1. C. W. DILL, M.E.I.C., Winnipeg, Man.  
*Superintendent of Highways, Province of Manitoba.*  
 5. O. S. JAMES, B.A.Sc., 6 Leuty Ave., Toronto, Ont.  
 1. A. LANE (deceased).  
 1. J. E. McALLISTER, B.A.Sc., C.E., Hamilton, Ont.  
*Gen. Mgr. National Steel Car Co.*  
 3. E. B. MERRILL, B.A., B.A.Sc., M.E.I.C., M. Am. Inst. E.E.,  
*Engineer, Hydro Electric Power Commission.*  
 1. J. E. A. MOORE, C.E., Cleveland, O.  
*Marani & Moore, Civil and Mechanical Engineers.*

## 1891—Continued.

1. W. NEWMAN, O.L.S., A.M.E.I.C.,  
*Consulting Engineer and Contractor.* Winnipeg, Man.
1. J. K. ROBINSON (deceased).
1. W. B. RUSSEL,  
*Civil Engineer and Contractor.* 601 Standard Bank Bldg., Toronto, Ont.
1. G. E. SILVESTER, O.L.S., M. Am. Inst. M.E.,  
*Harbour Comm. Building, Toronto, Ont.*  
*International Nickel Comm. of Canada, Ltd.*
1. H. D. SYMMES,  
*Engineer and Contractor.* Niagara Falls S., Ont.

## 1892.

1. J. R. ALLAN, O.L.S., Renfrew, Ont.
1. T. H. ALISON, B.A.Sc., C.E.,  
*Secretary and Chief Engineer, Bergen Point Iron Works.* Bayonne, N.J.
1. A. G. ANDERSON.  
*Hardware Merchant.* Port Dover, Ont.
1. C. C. FAIRCHILD, D. & O.L.S. 608 Tegler Blk., Edmonton, Alta.  
*Consulting Engineer and Surveyor.*
1. J. B. GOODWIN, B.A.Sc., Niagara Falls, Ont.  
*Works Engineer, H.E.P. Development.*
4. C. E. LANGLEY, Continental Life Bldg., Toronto, Ont.  
*Langley & Howland, Architects.*
1. A. T. LAING, B.A.Sc., Toronto, Ont.  
*Secretary and Assistant Professor, of Applied Mechanics, Faculty of Applied Science, University of Toronto.*
1. E. J. LASCHINGER, B.A.Sc., M.E., Johannesburg, Transvaal, S.A.  
*Hydraulic and Air Power Engineer, Central Mining and Investment Corporation.*
5. W. L. LAWSON, B.A.Sc., Billings, Mont.  
*Asst. Gen. Manager, Great Western Sugar Co.*
3. W. A. LEE, B.A.Sc. (deceased).
1. B. MCENTEE, B.A.Sc., 28 Queen St. E., Toronto, Ont.  
*Stationer.*
3. C. G. MILNE, B.A.Sc. (deceased),
1. C. H. MITCHELL, B.A.Sc., C.E., M.E.I.C., M. Am. Inst. Soc. C.E.,  
Brigadier-General  
Toronto, Ont.  
*Dean, Faculty of Applied Science and Engineering, University of Toronto.*
1. N. L. PLAYFAIR, Vancouver, B.C.
1. J. M. PRENTICE (deceased).
1. J. A. ROSS, Cleveland, Ohio  
*Designer L. S. & M. S. Railway, Engineering Office.*
1. ALBERT N. SMITH, Youngstown, Ohio  
*Engineer, Wm. B. Pollock Co.*
1. R. W. THOMSON, B.A.Sc., M.E., Kamloops, B.C.  
*Dist. Mining Engineer for B.C.*
3. A. V. WHITE, M.E., Toronto, Ont.  
*Engineer, Commission of Conservation.*

## 1893.

1. A. G. ARDAGH, Barrie, Ont.  
*Land Surveyor and Civil Engineer.*
- 4.\*H. F. BALLANTYNE, B.A.Sc., 2 West 47th St., New York, N.Y.  
*Architect.*

1893. *Continued*

1. G. L. BROWN, O.L.S., A.M.E.I.C.,  
*Civil Engineer and Land Surveyor.* Morrisburg, Ont.
- 1.\*L. C. CHARLESWORTH, D.L.S.,  
*Deputy Minister of Public Works.* Edmonton, Alta.
1. T. H. DUNN, D. & O.L.S., M.E.I.C.,  
*Water Power Branch, Dept. of the Interior.* Ottawa, Ont.
1. J. M. R. FAIRBAIRN, P.I.S.,  
*Chief Engineer, C. P. R.* Montreal, Que.
- 4.\*W. FINGLAND,  
*Architect.* 334 Portage Ave., Winnipeg, Man.
1. C. FORRESTER,  
1.\*WALTER J. FRANCIS, C.E., M.E.I.C., M. Am. Soc. C.E.,  
*Walter J. Francis & Co., Consulting Engineers.* Toronto, Ont.
- 260 St. James St., Montreal, Que.
- 3.\*A. R. GOLDIE,  
*Manager, Goldie & McCulloch Co.* Galt, Ont.
3. S. C. HANLY,  
*Midland Iron Works Co.* Midland, Ont.
- 4.\*J. KEELE, A.M., B.A.Sc.,  
*Ceramic Engineer, Dept. of Mines.* Ottawa, Ont.
1. J. T. LAIDLAW, B.A.Sc., M.E.,  
*Consulting Mining Engineer.* Cranbrook, B.C.
3. F. L. LASH,  
*Manager, Electrical Supply Co., Board of Trade Building.* Bandoeng, Java
1. A. L. MCALLISTER, B.A.Sc.,  
*Consulting Engineer.* 213 Huron St., Toronto, Ont.
1. T. J. MCFARLEN,  
*Chemist, Antikokan Iron Co.* Port Arthur, Ont.
1. A. J. MCPHERSON, B.A.Sc., D.L.S.,  
*Deputy Minister of Public Works for Sask.* Regina, Sask.
1. A. F. MACALLUM, B.A.Sc., C.E.,  
*Commissioner of Works.* Ottawa, Ont.
1. W. T. MAIN,  
*Division Engineer, C. & N. W. Ry.* Silverton, Oregon
1. V. G. MARANI, C.E.,  
*Marani & Moore, Civil and Mechanical Engineers.* Cleveland, Ohio
1. W. MINES, B.A.Sc.,  
*Mechanical Engineer, Hoover & Mason.* Chicago, Ill.
- 3.\*J. M. ROBERTSON,  
*Consulting Engineer.* Montreal, P.Q.
1. R. K. RUSSEL,  
*Railway Contractor.* Bank of Hamilton Bldg., Toronto, Ont.
- 1.\*F. N. SPELLER, B.A.Sc.,  
*Metallurgical Engineer, National Tube Co.* Pittsburgh, Pa.
1. H. R. SQUIRE, B.A.Sc., O.L.S. (deceased).
1. W. V. TAYLOR, O.L.S., A.M.E.I.C.,  
*Assist. Chief Engineer, Quebec Harbour Commission.* Quebec, P.Q.
- 1.\*R. B. WATSON (deceased).

## 1894.

- 3.\*R. W. ANGUS, B.A.Sc., Mem. Am. Soc. M.E.  
*Professor of Mechanical Engineering, University of Toronto.* Toronto, Ont.
1. H. F. BARKER,  
1. A. T. BEAUREGARD, B.A.Sc.,  
Darien, Conn.

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 111

1894—Continued.

1. A. E. BERGEY,  
*Assoc. Professor, Carnegie Inst. of Technology.* Pittsburgh, Pa.
3. D. G. BOYD,  
*Department of Lands and Mines, Parliament Buildings.* Toronto, Ont.
3. W. A. BUCKE,  
*Manager, Apparatus Sales Dept., Canadian General Electric Co.* Toronto, Ont.
1. J. CHALMERS, O.L.S., A.M.E.I.C.,  
*Consulting Engineer, 13012 104th Avenue.* Edmonton, Alta.
- 4.\*J. A. EWART, B.A.Sc.,  
*Architect.* 415 Booth Bldg., Ottawa, Ont.
3. W. J. HERALD, B.A.Sc.,  
190 Whitney Ave., Sydney, N.S.
3. H. E. JOB, B.A.Sc.,  
*Manager, Toronto and Hamilton Electric Co.* Hamilton, Ont.
1. S. M. JOHNSON, B.A.Sc., B.C.I.S.
3. A. C. JOHNSTON, B.A.Sc., M.E.,  
*Vice-President and Chief Engineer, The J. M. Dodge Co.* Philadelphia, Pa.
1. J. E. JONES,  
Toronto, Ont.
3. N. M. LASH,  
*Chief Engineer, Bell Telephone Co.* Montreal, P.Q.
- 1.\*A. L. McTAGGART, B.A.Sc.,  
*Mechanical Engineer.* 703 Arch St., Pittsburg, Pa.
- 3.\*W. MINTY, B.A.Sc.,  
*With Messrs. Yates & Thom, Ltd., Engineers.* Blackburn, Eng.
3. C. J. NICHOLSON,  
*Assistant Engineer, Toronto, Hamilton & Buffalo Ry.* Hamilton, Ont.
1. H. ROLPH,  
*Chief Engineer, John S. Metcalf Co., Ltd.* Montreal, Que.
1. J. D. SHIELDS, B.A.Sc.,  
48 Summerhill Gdns., Toronto, Ont.
1. ANGUS SMITH, C.E., O.L.S., A.M.E.I.C.,  
*City Engineer.* Prince Albert, Sask.
3. A. K. SPOTTON.  
*Chief Engineer, Goldie & McCulloch Engine Works.* Galt, Ont.
3. R. T. WRIGHT, B.A.Sc.,  
*Engineering Department, Westinghouse Machine Co.* East Pittsburgh, Pa.

1895.

1. J. ARMSTRONG, B.A.Sc.,  
*Chief Engineer of the Hudson Bay Ry.* LePas, Man.
3. A. E. BLACKWOOD,  
*Manager, New York Office, Sullivan Machinery Co.* 30 Church St., New York
1. E. J. BOSWELL, D.L.S.,  
*With C. P. R.* Montreal, Que.
3. G. BREBNER (deceased).
3. W. M. BRODIE, B.A.Sc.,  
29 Rathnally Ave., Toronto, Ont.
3. L. L. BROWN,  
*Vice-President, The Foundation Co.* The Woolworth Bldg., New York
4. R. J. CAMPBELL,  
*Artist, Chicago Tribune.* Chicago, Ill.
3. A. W. CONNOR, B.A., C.E.,  
*Private Practice.* 34 Victoria St., Toronto, Ont.
1. J. S. DOBIE, B.A.Sc., O. & D.L.S.,  
*President, O. L. S. Assoc.* Thessalon, Ont.
1. F. W. GUERNSEY,  
*Manager, Mason Valley Mines Co.* Thompson, Nev.

\*Diploma with honours.

## 1895—Continued.

- 4.\*A. H. HARKNESS, B.A.Sc., Confederation Life Bldg., Toronto, Ont.  
*Consulting Structural Engineer, Harkness, Loudon and Herizberg.*
3. H. S. HULL, B.A.Sc., Johnstown, Pa.  
*Structural Drawing, Cambria Steel Co.*
- 3.\*J. McGOWAN, B.A., B.A.Sc., Toronto, Ont.  
*Professor of Applied Mechanics, University of Toronto.*
3. W. N. MCKAY, Georgetown, Ont.  
*Manager of Bank of Hamilton.*
3. H. L. MCKINNON, B.A.Sc., Cleveland, Ohio  
*Brown Hoisting Machinery Co.*
1. W. W. MEADOWS, D. & O.L.S., Maple Creek, Sask.  
*Department of Public Works.*
1. F. J. ROBINSON, D. & O.L.S. (deceased).
3. F. T. STOCKING, Toronto, Ont.  
*Hydro-Electric Power Commission.*
3. R. C. C. TREMAINE, B.A.Sc. (deceased).

## 1896.

- 2.\*J. W. BAIN, B.A.Sc., Toronto, Ont.  
*Professor of Chemical Engineering, University of Toronto.*
2. L. T. BURWASH, M.E., 511 Ontario St., Toronto, Ont.
- 3.\*G. M. CAMPBELL, Lynn, Mass.  
*Electric Co.*
2. J. A. DECEW, B.A.Sc., 501-5th Ave., New York, N.Y.  
*Process Engineer*
- 3.\*H. P. ELLIOTT, B.A.Sc., E.E., London, Ont.  
*Consulting Electrical Engineer.*
3. W. C. GURNEY (deceased).
- 3.\*H. V. HAIGHT, B.A.Sc., Sherbrooke, P.Q.  
*Chief Engineer, Canadian Ingersoll Rand Co.*
1. W. F. LAING (deceased).
3. R. R. LAWRIE (deceased).
3. C. MACBETH, B.A.Sc. (deceased).
3. J. A. MACMURCHY, Pittsburg, Pa.  
*Chief Draftsman, Turbine Dept., Westinghouse Machine Co.,*
1. T. MARTIN, B.A.Sc., Moose Jaw, Sask.  
*Assistant Divisional Engineer, C. P. R., Western Division.*
3. R. R. SCHEIBE, Toronto, Ont.  
*Sales Manager, Brigdens, Ltd.*

## 1897.

2. E. ANDREWES, B.Sc., A.M.I.C.E., Portmadoc, N. Wales.  
*Resident Engineer, Maenofferen Slate Quarry Co., Ltd.*
- 2.\*J. A. BOW, Chanaral, Chili, S. America.  
*c/o Andes Copper Mining Co.*
1. H. S. CARPENTER, B.A.Sc., O.L.S., Regina, Sask.  
*Superintendent of Highways, Department of Public Works.*
5. H. W. CHARLTON, B.A.Sc., New York, N.Y.  
*Patent Expert.*
- 4.\*E. A. FORWARD, A.M.E.I.C., Montreal, Que.  
*With Haney, Quinlan & Robertson.*
- 3.\*A. T. GRAY, B.A.Sc., Schenectady, N.Y.  
*Designing Engineer on Steam Turbines, General Electric Co.*

\*Diploma with honours

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 113

1897—Continued.

- |  |                                    |
|--|------------------------------------|
| 3. W. A. B. HICKS,   | Philadelphia, Pa.                  |
| 4. C. F. KING,<br><i>The Great West Perm. Loan Co.</i>                                     | 356 Main St., Winnipeg, Man.       |
| 1. H. W. PROUDFOOT (deceased).   |                                    |
| 2.*A. H. A. ROBINSON, B.A.Sc., M.A.I.M.E.,<br><i>Mining Engineer, Department of Mines.</i> | Ottawa, Ont.                       |
| 4. W. F. SCOTT,<br><i>Structural Engineer and Consulting Architect.</i>                    | Dunnville, Ont.                    |
| 3.*W. R. SMILEY, B.A.Sc.,<br><i>With Wellman-Seaver-Morgan Engineering Co.</i>             | Cleveland, Ohio.                   |
| 2.*W. W. STULL, B.A.Sc., O.L.S.,<br><i>Surveyor and Mining Engineer.</i>                   | Sudbury, Ont.                      |
| 1.*M. B. WEEKES, B.A.Sc., D.L.S.,<br><i>Department of Public Works.</i>                    | Regina, Sask.                      |
| 1. E. A. WELDON,<br><i>Investment Broker.</i>  | 711 McIntyre Block, Winnipeg, Man. |

1898.

- |   |                 |
|---|-----------------|
| 1. W. H. BOYD, B.A.Sc.,<br><i>Geological Survey of Canada.</i>  | Ottawa, Ont.    |
| 2. W. E. H. CARTER, B.A.Sc., (deceased)   |                 |
| 3. E. H. DARLING, M.E., A.M.E.I.C.,<br><i>Resident Engineer, East Hamilton Plant, Hamilton Bridge Works Co.</i>             | Hamilton, Ont.  |
| 1. W. F. GRANT, B.A.Sc. (deceased).   |                 |
| 1. J. S. KOEMANN, B.A.Sc.,<br><i>Manager, Kormann Brewing, Ltd.</i>   | Toronto, Ont.   |
| 3. J. E. LAVROCK,<br><i>Draftsman, Hermon &amp; Burwell.</i>  | Vancouver, B.C. |
| 4. D. MACKINTOSH, B.A.Sc., B.Arch.,<br><i>Chief Superintendent F. M. Andrews &amp; Co., Metropolitan Tower.</i>             | Bennington, Vt. |
| 1.*F. W. MCNAUGHTON, O.L.S.,<br><i>C.P.R., Dept. of Natural Resources.</i>  | Calgary, Alta.  |
| 1. J. H. SHAW, O.L.S.,<br><i>Surveyor and Engineer.</i>   | North Bay, Ont. |
| 3. A. E. SHIPLEY, B.A.Sc.,<br><i>Manager, Nelson Coke &amp; Gas Co.</i>   | Nelson, B.C.    |
| 3.*F. C. SMALLPIECE, B.A.Sc.,<br><i>122 Eleventh Ave. W., Calgary, Alta.</i><br><i>Chief Engineer, General Supplies Co.</i> |                 |
| 1.*R. W. SMITH, P.L.S. (killed in action, France, 1916).  |                 |
| 1.*J. A. STEWART, M.A.,<br><i>Chief Engineer, Toronto Structural Steel Co.</i>  | Toronto, Ont.   |
| 1.*H. L. VERCOE,  | Toronto, Ont.   |
| 3. T. A. WILKINSON,<br><i>Manager, Electro-Tin Products Co., Ltd.</i>   | Brantford, Ont. |
| 3. D. A. WILLIAMSON, B.A.Sc.,<br><i>Structural Steel Engineer, Dept. of Public Works.</i>                                   | Ottawa, Ont.    |

1899.

- |   |                |
|---|----------------|
| 3.*T. BARBER,<br><i>Hydraulic Engineer, Chas. Barber &amp; Sons.</i>            | Meaford, Ont.  |
| 2. J. T. M. BURNSIDE, B.A.Sc. (deceased).                                       |                |
| 3. L. B. CHUBBUCK, B.A.Sc., E.E.,<br><i>Engineer, Canadian Westinghouse Co.</i> | Hamilton, Ont. |

\*Diploma with honours.

## 1899—Continued.

2. G. A. CLOTHIER,  
*Mining Engineer and Surveyor.* Stewart, B.C.  
1. C. COOPER, Carlyle, Sask.  
2. R. W. COULTHARD, B.A.Sc.,  
*Department Soldiers' Civil Re-establishment.* Toronto, Ont.  
3. J. A. CRAIG, B.A.Sc., Toronto, Ont.  
2. J. C. ELLIOTT, Kelso, Ont.  
3. W. E. FOREMAN, B.A.Sc.,  
*Construction Dept., Westinghouse Electric and Mfg. Co.* Pittsburgh, Pa.  
3. E. GUY, B.A.Sc., Toronto, Ont.  
3.\*W. ALMON HARE, B.A.Sc., A.M.E.I.C., Detroit, Mich.  
1. R. LATHAM, B.A.Sc., Hamilton, Ont.  
*Chief Engineer, T. H. & B. Ry.*  
3. W. MONDS, B.A.Sc., 191 St. John's Road, Toronto, Ont.  
1. J. PATTERSON, B.A., Toronto, Ont.  
*Physicist, Dominion Observatory.*  
3. A. S. H. POPE, B.A.Sc., Portland, Oregon  
2. G. E. REVELL, B.A.Sc. (killed in action, France, 1915).  
3.\*E. RICHARDS, B.A.Sc., Ottawa, Ont.  
*Customs Appraiser.*  
3. G. A. SAUNDERS, Toronto, Ont.  
*Asst. Engineer, Hydro-Electric Power Commission.*  
1.\*T. SHANKS, B.A.Sc., D.L.S., Ottawa, Ont.  
*Assistant Surveyor-General, Department of the Interior.*  
1.\*D. C. TENNANT, B.A.Sc., Montreal, Que.  
*Struc. Eng., Dom. Bridge Co.*  
3. W. W. VANEVERY, Sault Ste. Marie, Ont.  
*City Engineer.*  
3. W. E. WAGNER, B.A.Sc., Springfield, Ill.  
*Manager, Smokeless Powder Division, Western Cartridge Co.*  
2. G. H. WATT, D.L.S., Ottawa, Ont.  
*Dominion Land Surveyor.*  
3. E. YEATES, London, Ont.  
*Manager, London Manufacturing and Machine Co.*

## 1900.

1. J. L. ALLAN, M.E.I.C., Dartmouth, N.S.  
*Secretary, Dartmouth Development Co.*  
2. E. G. R. ARDAGH, B.A.Sc., Toronto, Ont.  
*Associate Professor of Chemical Engineering, University of Toronto.*  
3. J. A. BAIN (deceased).  
3. J. H. BARLEY, B.A.Sc., Hamilton, Ont.  
*Canadian Westinghouse Electric and Manufacturing Co.*  
2.\*M. C. BOSWELL, M.A., Ph.D., Toronto, Ont.  
*Assoc. Professor of Organic Chemistry, University of Toronto.*  
1. L. T. BRAY, D. & O.L.S., Edmonton, Alta.  
*District Engineer.*  
3. J. CLARK, Toronto, Ont.  
~~■~~ *Turnbull Elevator Mfg. Co.*  
2. J. E. DAVISON, B.A.Sc., Winnipeg, Man.  
*Engineering Staff, Canadian National Ry.*  
3. E. D. DICKINSON, Schenectady, N.Y.  
*With General Electric Co.*

\*Diploma with honours.

## 1900—Continued.

3. G. W. DICKSON, B.A.Sc.,  
*With Riordan Pulp & Paper Co.* Hawkesbury, Ont.
- 2.\*H. A. DIXON, B.A.Sc., M.L.S.,  
*District Engineer, Canadian National Railway.* Jasper, Alta.
2. C. H. FULLERTON, O.L.S.,  
*Engineer and Surveyor.* New Liskeard, Ont.
3. W. S. GUEST, B.A.Sc.,  
*Lecturer in Electrical Engineering, University of Toronto.* Toronto, Ont.
3. W. HEMPHILL, B.A.Sc., E.E.,  
*Superintendent, Cataract Power & Conduit Co.* Buffalo, N.Y.
2. S. E. M. HENDERSON,  
*Canadian General Electric Co* Toronto, Ont.
3. J. A. HENRY,  
*Designing Engineer, General Electric Co.* Schenectady, N.Y.
2. H. S. HOLCROFT, B.A.Sc., D.L.S. (Died of wounds received in action, France, 1916).
3. H. A. JOHNSON, Toronto, Ont.
3. J. C. JOHNSTON,  
*Plant Inspector, Warren Bituminous Paving Co.* Boston, Mass.
- 2.\*J. A. JOHNSTON, B.A.Sc.,  
*Contractor.* Ignace, Ont.
2. R. E. McARTHUR, Lethbridge, Alta.
2. J. G. McMILLAN, B.A.Sc., M.E.,  
*Inspector of Mines.* New Liskeard, Ont.
3. L. HAUN MILLER,  
*Sales Agent, Bethlehem Steel Co.* Cleveland, Ohio
2. E. V. NEELANDS, B.A.Sc.,  
*Manager, Peters Mines.* New Guiana, S. America
- 1.\*E. H. PHILLIPS, D.L.S.,  
*Phillips & Phillips, Civil Engineers and Surveyors.* Saskatoon, Sask.
2. J. R. ROAF, B.A.Sc.,  
*Dept. of Soldiers' Civil Re-establishment.* Victoria, B.C.
- 3.\*C. H. E. ROUNTHWAITE,  
*Chief Draftsman, Algoma Central & Hudson Bay Ry.* Sault Ste. Marie, Ont.
2. H. W. SAUNDERS, B.A.Sc.,  
*Division Engineer, U. S. Coal & Coke Co.* Gary, W.Va.
1. A. TAYLOR, D. & M.L.S.,  
*Engineer and Surveyor.* Portage la Prairie, Man.
1. W. C. TENNANT, B.A.Sc. (deceased).
2. S. M. THORNE, B.A.Sc.,  
*With Soldiers' Civil Re-establishment.* Toronto, Ont.
1. F. W. THOROLD, B.A.Sc., M.E.I.C.,  
*Consulting and Contracting Engineer.* 167 Avenue Rd., Toronto, Ont.
1. H. M. WEIR, B.A.Sc.,  
*City Engineer's Office.* Saskatoon, Sask.
3. F. D. WITHROW,  
*Patent Examiner, Dept. of Agriculture.* Ottawa, Ont.

## 1901.

1. R. H. BARRETT, B.A.Sc., O.L.S. (deceased).
3. W. G. BEATTY,  
*Manager, Beatty Bros., Implement Manufacturers.* Fergus, Ont.
3. G. M. BERTRAM,  
*Lincoln Electric Co. of Canada, Ltd.* Toronto, Ont.

\*Diploma with honours.

## 1901—Continued.

3. W. J. BOWERS (deceased).
3. E. T. J. BRANDON, B.A.Sc., 190 University Ave., Toronto.  
*Electrical Engineer, Hydro-Electric Power Commission.* Ont,
3. W. P. BRERETON, B.A.Sc., Winnipeg, Man.  
*City Engineer.*
3. J. T. BROUGHTON, Columbus, Ohio.  
*Gen. Mgr., Factory Sales Co.*
- 3.\*W. G. CHACE, B.A.Sc., Winnipeg, Man.  
*Chief Engineer, Greater Winnipeg Water District.*
3. A. G. CHRISTIE, M.E. Baltimore, Md.  
*Assoc. Professor of Mechanical Engineering, Johns Hopkins University*
3. J. R. COCKBURN, B.A.Sc., A.M.E.I.C., Toronto, Ont.  
*Associate Professor of Descriptive Geometry, University of Toronto.*
1. W. A. DUFF, Moncton, N.B.  
*Engineer of Bridges, Intercolonial Ry.*
- 2.\*D. E. EASON, B.A.Sc., Peterboro', Ont.  
*Division Engineer, Trent Valley Canal.*
- 1.\*S. GAGNE, B.A.Sc. (deceased).
3. N. R. GIBSON, B.A.Sc., Niagara Falls, N.Y.  
*Hydraulic Engineer, Niagara Falls Power Co.*
2. A. T. E. HAMER, Wahnapitae, Ont.  
*Engineering Staff, Canadian Northern Ry. Co.*
1. C. HARVEY, B.A.Sc., D.L.S., C.E., B.C.L.S. Kelowna, B.C.  
*Consulting Engineer and Surveyor.*
2. F. C. JACKSON, Seaforth, Ont.
- 3.\*R. A. LAIDLAW, C.E. Houston, Texas  
*Engineer and Sales Agent, Trussed Concrete Steel Co.*
3. W. C. LUMBERS, Calgary, Alta.  
*Engineering Staff, C. P. R.*
2. A. C. MACDOUGALL, Ottawa, Ont.
3. A. T. C. McMMASTER, B.A.Sc., Toronto, Ont.  
*Engineer and Contractor.*
1. G. MACMILLAN, Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*
- 3.\*H. G. MCVEAN, B.A.Sc., 3120 Rae Street, Regina, Sask.
2. W. C. MATHESON, Joliette, Que.  
*With Mackenzie-Mann & Co.*
3. H. T. MIDDLETON, Englewood Cliffs, N.J.
2. J. L. R. PARSONS, B.A., D.L.S., Regina, Sask.  
*Parsons Construction Co.*
1. G. H. POWER, Winnipeg, Man.  
*Western Canada Rep. of Willis Chipman, C.E.*
- 3.\*H. W. PRICE, B.A.Sc., Toronto, Ont.  
*Professor of Electrical Engineering, University of Toronto.*
1. H. P. RUST, B.A.Sc., A.M.E.I.C., Philadelphia, Pa.  
*Engineer, J. P. Morris Co.*
3. M. V. SAUER, B.A.Sc., Toronto, Ont.  
*Engineer, Hydro-Electric Power Commission.*
3. W. H. STEVENSON, B.A.Sc., Monadnock Block, Chicago, Ill.  
*Secretary, Power Plant Specialty Co.*
1. R. D. WILLSON (deceased)

\*Diploma with honours.

1902.

3.*H. G. BARBER,	Ottawa, Ont.
<i>Topographical Surveys Branch, Department of the Interior.</i>	
1. W. J. BLAIR, B.A.Sc., D. & O.L.S.,	Calgary, Alta.
3. J. M. BROWN,	Pittsburgh, Pa.
<i>With Westinghouse Machine Co., Steam Turbine Dept.</i>	
2. W. G. CAMPBELL,	Toronto, Ont.
<i>Campbell &amp; Lattimore.</i>	
2. A. R. CAMPBELL (deceased).	
3. C. G. CARMICHAEL (deceased).	
2.*W. CHRISTIE, B.A.Sc.,	Prince Albert, Sask.
<i>Dominion Land Surveyor.</i>	
2. F. T. CONLON (deceased).	
3. H. V. CONNOR,	Hamilton, Ont.
<i>Canadian Westinghouse Co.</i>	
2.*M. T. CULBERT (deceased).	
2. R. CUMMING,	Toronto, Ont.
<i>Price, Cumming Brick Co.</i>	
1. W. E. DOUGLAS, B.A.,	152 Bay St., Toronto, Ont.
<i>Contractor.</i>	
3.*R. J. DUNLOP,	Toronto, Ont.
<i>With Canadian Westinghouse Co.</i>	
2. W. M. EDWARDS, B.A.Sc.,	Lethbridge, Alta.
<i>Duff &amp; Edwards.</i>	
3. W. ELWELL (deceased).	
2. J. M. EMPEY, B.A.Sc., O. & D.L.S.,	Calgary, Alta.
<i>Engineer and Surveyor.</i>	
2.*D. L. H. FORBES, M.E.	Chuquicamata, Chili, South America.
<i>Chief Const. Engineer, Chili Exploration Co.</i>	
1.*A. E. GIBSON, B.A.Sc.,	Toronto, Ont.
<i>Roger Miller &amp; Sons, Engineers and Contractors.</i>	
3. A. C. GOODWIN,	Toronto, Ont.
<i>With Hydro-Electric Power Commission.</i>	
3. C. P. HENWOOD,	McKeesport, Pa.
<i>Draftsman, National Tube Co.</i>	
3. D. M. JOHNSTON,	Toronto, Ont.
<i>With Hydro-Electric Power Commission.</i>	
2. R. H. KNIGHT, B.A.Sc., D.L.S.,	Edmonton, Alta.
<i>Driscoll &amp; Knight, Engineers and Surveyors.</i>	
5.*F. L. LANGMUIR, B.A.Sc., Ph.D.,	800 King St. W., Toronto,
<i>Vice-Pres., M. Langmuir Mfg. Co.</i>	[Ont.]
3. A. H. MCBRIDE, B.A.Sc.,	Toronto, Ont.
<i>Assistant Engineer, Hydro-Electric Power Commission.</i>	
3. J. T. MACKAY,	Toronto, Ont.
1. A. L. MACLENNAN, D.L.S.	Toronto, Ont.
<i>Department Soldiers' Civil Re-establishment.</i>	
3. J. F. S. MADDEN,	Toronto, Ont.
<i>Hydro-Electric Power Commission.</i>	
3.*C. H. MARRS, C.E.,	Hamilton, Ont.
<i>Hamilton Bridge Works.</i>	
3. P. MATHISON, B.A.Sc.,	East Pittsburgh, Pa.
<i>Westinghouse Electric &amp; Manufacturing Co.</i>	
3. R. S. MENNIE,	Pittsburgh, Pa.
<i>With Crucible Steel Co. of America.</i>	

\*Diploma with honours.

1902—Continued.



1903.

- |  |                                    |
|--|------------------------------------|
| 3. H. G. ACRES,<br><i>Asst. Engineer, Hydro-Electric Power Commission.</i>             | Toronto, Ont.                      |
| 1. J. G. R. ALISON,<br><i>With Hydro-Electric Power Commission.</i>                    | Niagara Falls, Ont.                |
| 3.*H. H. ANGUS, B.A.Sc.,<br><i>Consulting Engineer.</i>                                | 23 River St., Toronto, Ont.        |
| 3. J. A. BEATTY,<br><i>Morrow &amp; Beatty, Contractors.</i>                           | Peterboro, Ont.                    |
| 3.*J. BRESLOVE,<br><i>Consulting Engineer.</i>   | Oliver Bldg., Pittsburgh, Pa.      |
| 2. J. H. BURD, O., D., S. & A. L. S., C.E.,<br><i>Engineer and Surveyor.</i>           | Saskatoon, Sask.                   |
| 1.*E. L. BURGESS, D.L.S.,<br><i>Burgess &amp; Taggart, Surveyors and Engineers.</i>    | Kamloops, B.C.                     |
| 2. N. A. BURWASH, B.A.Sc.,<br><i>Dept. of Public Highways.</i>                         | Toronto, Ont.                      |
| 1. F. F. CLARKE, D. & O.L.S., A.M.E.I.C.,  | 137 Sheldrake Blvd., Toronto, Ont. |
| 2. C. L. COULSON,<br><i>Chief Engineer.</i>  | Welland, Ont.                      |
| 3.*A. E. DAVISON, B.A.Sc., C.E.<br><i>Asst. Eng., Hydro-Electric Power Commission.</i> | Toronto, Ont.                      |
| 3. C. J. FENSON, B.A.Sc., M.E.,<br><i>Works Engineer, Otis-Fensom Elevator Co.</i>     | Hamilton, Ont.                     |
| 2.*E. O. FUCE, O.L.S.,<br><i>Engineer and Surveyor.</i>                                | 84 King Street E., Toronto, Ont.   |
| 3.*F. A. GABY, B.A.Sc.,<br><i>Chief Engineer, Hydro-Electric Power Commission.</i>     | Toronto, Ont.                      |
| 1. J. C. GARDNER, B.A.Sc.,<br><i>Consulting Engineer.</i>                              | Niagara Falls, Ont.                |

\*Diploma with honours.

1903—Continued.

3. R. E. GEORGE (deceased).  
 1.\*P. GILLESPIE, B.A.Sc., C.E. Toronto, Ont.  
*Associate Professor of Applied Mechanics, University of Toronto.*
1. W. A. GOURLAY, 2099 Granite St., Victoria, B.C.  
*Chief Engineer, Dominion Govt*
2. J. F. HAMILTON, B.A.Sc., C.E., Lethbridge, Alta.  
*Hamilton & Young, Dominion Land Surveyors and Engineers.*
2. G. S. HANES, B.A.Sc., O.L.S., North Vancouver, B.C.  
 2. F. Y. HAROURT, B.A., Port Arthur, Ont.  
*Engineer, Public Works Dept.*
1. L. J. HAYES, 2434 Niagara Ave., Niagara Falls, N.Y.  
 1.\*F. D. HENDERSON, Secy. Board of Examiners for D.L.S., Ottawa, Ont.  
*Topographical Surveys Branch, Department of the Interior.*
- 5.\*J. A. HORTON, Winnipeg, Man.  
*Chemist, Lever Brothers.*
3. J. G. JACKSON, Chatham, Ont.  
*Manager, Public Utilities.*
3. G. K. JOHNSTON, Pefferlaw, Ont.  
*Merchant.*
1. H. JOHNSTON, C.E., O.L.S., Kitchener, Ont.  
*Consulting Engineer.*
3. A. G. LANG, 190 University Ave., Toronto, Ont.  
*Asst. Eng., Hydro-Electric Power Commission.*
- 1.\*A. J. LATORNELL, B.A.Sc. (died of wounds received in action, 1917).  
 1.\*H. J. MCASLAN, B.A.Sc., O.L.S., North Bay, Ont.  
 3. J. A. MCFARLANE, B.A.Sc., Hamilton, Ont.  
*Chief Draftsman, Hamilton Bridge Works Co.*
- 1.\*A. L. MCNAUGHTON,  
 5.\*F. G. MARRIOTT, B.A.Sc., Toronto, Ont.  
*Chemist and Supt. Asphalt Plant, City Testing Laboratory.*
- 3.\*C. A. MAUS, Paris, Ont.  
 3.\*M. L. MILLER, 845 Canton Ave., Detroit, Mich.  
*Edison Electric Co.*
3. P. H. MITCHELL, E.E., Toronto, Ont.  
*Consulting Electrical Engineer, Bank of Hamilton Building.*
- 2.\*R. H. MONTGOMERY, B.A.Sc., O. and D.L.S., Prince Albert, Sask.  
*Engineer and Surveyor.*
1. F. A. MOORE, 259 Russell Hill Rd., Toronto, Ont.  
 3. E. E. MULLINS, Port Limon, Costa Rica.  
*Supt. Motive Power, Northern Ry. Co.*
3. I. H. NEVITT, B.A.Sc., Toronto, Ont.  
*Asst. Engineer, Main Drainage Dept., City Hall.*
1. E. W. OLIVER, B.A.Sc., C.E., Toronto, Ont.  
*Assistant to Chief Engineer, Canadian National Ry. System.*
3. J. P. OLIVER, Saskatoon, Sask.  
 3. J. D. PACE, B.A.Sc., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
3. B. B. PATTEN, B.A.Sc., St. Catharines, Ont.  
*With Welland Ship Canal.*
2. D. H. PHILP, Niagara Falls, Ont.  
*With Hydro-Electric Power Commission.*
- 3.\*D. H. PINKNEY, Lorain, O.  
*National Tube Co.*

\*Diploma with honours.

## 1903—Continued.

2. T. H. PLUNKETT, B.A.Sc.,  
*Dominion Land Surveyor.* Meaford, Ont.  
1. D. F. ROBERTSON, D.L.S.,  
*Dept. of Indian Affairs.* Ottawa, Ont.  
3.\*H. M. SCHEIBE, B.A.Sc., Boston, Mass.  
1.\*H. L. SEYmour, B.A.Sc., D.L.S.,  
*Federal Housing Commission.* Ottawa, Ont.  
1. J. H. SMITH, D. & O.L.S., 140 Jasper Ave. West, Edmonton, Alta.  
*Engineer and Surveyor.*  
3. H. G. SMITH, B.A.Sc. (deceased). Whitby, Ont.  
3. S. L. TREES, B.A.Sc.,  
*Manager, Samuel Trees & Co.*  
2. J. E. UMBACH,  
*Surveyor General, British Columbia.* Victoria, B.C.  
1. J. WALDRON, D.L.S.,  
*Engineer and Surveyor.* Moose Jaw, Sask.  
3.\*S. B. WASS,  
*Supt. St. John & Quebec R.R.* Fredericton, N.B.  
3. J. A. WHELIHAN, Box 165, Regina, Sask.  
3. H. F. WHITE, London, Ont.  
c/o Geo. White & Sons Co., Ltd.  
2.\*C. G. WILLIAMS, B.A.Sc., Timmins, Ont.  
*Supt., Hollinger Consolidated Gold Mines, Ltd.*  
1.\*N. D. WILSON, B.A.Sc., Toronto, Ont.  
*Toronto Harbour Commission.*  
1.\*C. R. YOUNG, B.A.Sc., C.E., M.E.I.C., Toronto, Ont.,  
*Associate Professor in Structural Engineering, University of Toronto.*

## 1904.

- 3.\*J. H. ALEXANDER, B.A., C.E., A. M. Am. Soc. C.E., Winnipeg, Man.  
*Engineer and Contractor.*  
3.\*J. H. BARRETT, Toronto, Ont.  
*With the Wm. Davies Co., Ltd.*  
3. M. B. BONNELL, Sanitarium, Ont.  
3. T. D. BROWN, B.A.Sc., Calgary, Alta.  
*Canadian Fairbanks Co.*  
1. R. J. BURLEY, Ottawa, Ont.  
*Dept. of the Interior.*  
3. F. W. BURNHAM, B.A.Sc.,  
*On Overseas Service.*  
3. J. W. CALDER, B.A.Sc., Fort William, Ont.  
*With Hydro-Electric Commission.*  
1. N. C. CAMERON, 4172 Dorchester St., Montreal, Que.  
*Dominion Engineering and Construction Co.*  
1. A. J. CAMPBELL, B.A.Sc., Collingwood, Ont.  
3.\*A. M. CAMPBELL, B.A.Sc., M.E. Grenville, Ohio.  
4. J. B. CHALLIES, C.E. Ottawa, Ont.  
*Supt. Water Power Branch, Dept. of the Interior.*  
2. C. A. CHILVER, Walkerville, Ont.  
*Contractor.*  
2. H. L. CHILVER, D.L.S., Windsor, Ont.  
*City Engineer's Dept., City Hall.*  
1. U. W. CHRISTIE, B.A.Sc., O.L.S., Orangeville, Ont.  
*Wheelock & Christie, Civil Engineers.*

\*Diploma with honours.

## 1904—Continued.

2. P. C. COATES, B.A.Sc.,  
*D. and B. C. Land Surveyor.* Victoria, B.C.
1. S. B. CODE, O.L.S.,  
*Civil Engineer and Land Surveyor.* Smith's Falls, Ont.
- 1.\*T. F. CODE, B.A.Sc. (deceased).
- 1.\*W. A. COWAN,  
*Division Engineer, Transcontinental Railway.* Cochrane, Ont.
- 3.\*S. E. CRAIG, B.A.Sc.,  
*Canadian Inspection and Testing Laboratories, Ltd.* Toronto, Ont.
- 1.\*S. R. CRERAR, B.A.Sc., O.L.S.,  
*Assistant Professor in Surveying, University of Toronto.* Toronto, Ont.
3. W. M. CURRIE,  
*General Manager, Burlington Steel Co., Ltd.* Hamilton, Ont.
3. H. H. DEPEW,  
*Supt. Crow's Nest Pass Electric Light and Power Co.* Fernie, B.C.
2. A. J. ELDER,  
*Topographical Surveys Branch, Department of the Interior.* Ottawa, Ont.
2. J. G. FLECK,  
500 Wilbrod St., Ottawa, Ont.
- 1.\*A. L. FORD, B.A.Sc.,  
*Government Inspector, Dept. of Railways and Canals.* Prince Rupert, B.C.
3. W. S. GIBSON, B.A.Sc.,  
38 Park Rd., Toronto, Ont.
1. J. N. GOODALL,  
*Gray-Dort Motors, Ltd.* Chatham, Ont.
1. J. P. GORDON,  
*Engineering Staff, Willis Chipman, C.E.* Box 266, Dauphin, Man.
3. W. W. GRAY, B.A.Sc.,  
*Inspector, Fairbanks Morse Co.* Toronto, Ont.
3. A. GRAY, B.A.Sc. (deceased).
3. W. K. GREENWOOD, B.A.Sc.,  
*Town Engineer.* Orillia, Ont.
1. L. D. HARA,  
*Assistant Engineer, Welland Canal Co.* St. Catharines, Ont.
3. C. J. HARRIS, B.A.Sc.,  
*Russell Motor Car Co.* Toronto, Ont.
1. J. B. HERON, B.A.Sc.,  
45 Benlamond Ave., Toronto Ont.
1. E. M. M. HILL,  
*Engineering Dept. Canadian National Railway.* Edmonton, Alta.
2. S. N. HILL, C.E.,  
*"The Alexandra", Ottawa, Ont.*
2. C. J. INGLES,  
*Topographical Surveys Branch, Department of the Interior.* 393 Keele St., Toronto, Ont.
1. E. A. JAMES, B.A.Sc., C.E.,  
*Consulting Engineer.* 36 Toronto St., Toronto, Ont.
1. P. V. JERMYN, B.A.Sc.,  
*Harkness, Lundon & Hertzberg.* Toronto, Ont.
3. W. S. H. KEEFE,  
*Manager, Light, Heat and Power Co.* Fort Covington, N.Y.
3. W. J. LARKWORTHY (deceased).
3. O. B. McCUAIG, B.A.Sc.,  
Penn Yann, N.Y.
1. G. G. McEWEN, B.A.Sc.,  
*Office of T. H. Dunn, O.L.S.* Winchester, Ont.
- 1.\*W. G. MCFARLANE, B.A., B.A.Sc.,  
*With Webb's Bakery.* Toronto, Ont.
- 3.\*C. P. McGIBBON, B.A.,  
*Canadian Westinghouse Co.* Hamilton, Ont.

\*Diploma with honours.

## 1904—Continued.

3. C. MCKAY, B.A.Sc. (deceased).
1. D. McMILLAN,  
With C.N.R.
- Edmonton, Alta.
3. G. J. MANSON, M.E.,  
*Engineer, Grenville Board Co.*
- Penetang, Ont.
- 1.\*W. N. MOORHOUSE,  
*George & Moorhouse, Architects.*
- Toronto, Ont.
3. E. E. MOORE,  
*Hydro-Electric Power Commission.*
- Toronto, Ont.
3. W. H. MUNRO, A.M.E.I.C.,  
*Hydro-Electric Eng., Vickers Ltd. of England.*
- N. Nigeria, Africa
3. G. PAGE, B.A.Sc.,  
With Hydro-Electric Power Commission.
- Toronto, Ont.
3. W. S. PARDOE, B.A.Sc.,  
*Asst. Prof. in Civil Engineering, University of Pennsylvania.*
- Philadelphia, Pa.
3. J. PARIS,  
c/o S. B. Clement, T.N.O. Ry.
- North Bay, Ont.
1. J. PARKE, B.A.Sc.,  
*Chemist and Assayer.*
- Havilah, Ont.
3. W. J. PEAKER,  
*Topographical Surveys Branch, Dept. of the Interior.*
- Ottawa, Ont.
- 3.\*A. E. PICKERING,  
*Manager, Tagona Light and Power Co.*
- Sault Ste. Marie, Ont.
1. D. L. C. RAYMOND, B.A.Sc.,  
*The Raymond Construction Co., Ltd.*
- Montreal, Que.
1. F. B. REID, B.A.Sc.,  
*Astronomical Surveys Branch, Dept. of the Interior.*
- Ottawa, Ont.
- 3.\*M. R. RIDDELL, B.A.Sc.,  
*Asst. to the Director, Eng. Expt. Station, University of Illinois.*
- Urbana, Ill.
1. L. H. ROBINSON, C.E.,
- Box 745, Truro, N.S.
3. G. S. ROXBURGH, B.A.Sc.,  
*Manager, Fetherstonhaugh & Co., Patent Solicitors and Engineers.*
- Winnipeg, Man.
2. F. N. RUTHERFORD, B.A.Sc.,  
*Engineer and Land Surveyor.*
- St. Catharines, Ont.
3. P. M. SAUDER,  
*Chief Hydrometric Engineer, Dept. of the Interior.*
- 513 8th Ave. W., Calgary, Alta.
- 1.\*J. D. SHEPLY, B.A.Sc., D.L.S.  
*District Surveyor and Engineer.*
- N. Battleford, Sask.
3. F. W. SLATER, B.A.Sc.,  
*With General Electric Co.*
- Schenectady, N.Y.
- 3.\*R. S. SMART, M.E.,  
*Manager, Fetherstonhaugh & Co., Patent Solicitors and Engineers.*
- Ottawa, Ont.
1. D. A. SMITH, B.A.Sc., D. & S. L. S.,  
On Overseas Service.
- Toronto, Ont.
3. W. J. SMITHER, B.A.Sc.,  
*Lecturer in Structural Engineering, University of Toronto.*
3. S. E. THOMSON, B.A.Sc.,  
*Engineering Staff, Electrical Development Co.*
- Niagara Falls, Ont.
3. C. J. TOWNSEND, B.A.Sc., C.E.  
*Wilson, Townsend & Saunders.*
- 79 Spadina Ave., Toronto, Ont.
1. D. T. TOWNSEND, B.A.Sc., O.L.S.,  
*Chief Surveyor, Dept. of Natural Resources, C.P.R.*
- Calgary, Alta.
1. A. V. TRIMBLE, B.A.Sc.,  
*Hydro-Electric Power Commission.*
- Toronto, Ont.

\*Diploma with honours.

## 1904—Continued.

3. B. B. TUCKER, B.A.Sc., Morrisburg, Ont.  
*Resident Engineer, New York and Ontario Power Co.*
- 2.\*E. WADE, B.A., Welland, Ont.  
*Builder.*
- 1.\*E. W. WALKER, B.A.Sc. (deceased).
3. J. P. WATSON, B.A.Sc., Montreal, Que.  
*With Dominion Bridge Co. Ltd.*
1. J. M. WEIR, 60 Chester Ave., Toronto, Ont.  
*Weir Bros., Apiarists.*
- 1.\*A. F. WELLS, O.L.S., B.A.Sc., 701 Confederation Life Bldg.,  
*Wells & Gray, Ltd., Engineers and Contractors.* [Toronto, Ont.]
1. W. R. WORTHINGTON, B.A.Sc., Toronto, Ont.  
*Consulting Engineer.*
3. W. F. WRIGHT, 86 Richmond St. E., Toronto, Ont.  
*District Manager, Eugene F. Phillips Electrical Works, Ltd.*

## 1905.

2. H. W. ARENS (deceased).
3. R. H. ARMOUR, 345 Jarvis Street, Toronto, Ont.
- 3.\*C. B. AYLESWORTH, Hamilton, Ont.  
*Draftsman, Canadian Westinghouse Co.*
- 1.\*W. BARBER, B.A.Sc., Toronto, Ont.  
*Engineer, Waterworks Department, City Hall.*
- 2.\*W. A. BEGG, B.A.Sc., Regina, Sask.  
*Department of Public Works.*
- 3.\*G. G. BELL, Sewickley, Pa.
1. J. C. BOECKH, Toronto, Ont.  
*With Boeckh Brush Co.*
3. W. M. BRISTOL, Halifax, N.S.  
*Canadian Westinghouse Co.*
2. W. C. CAMPBELL, Keene, Ont.
3. W. R. CARSON, Cleveland, O.  
*Engineering Dept., Grasselli Chemical Co.*
1. A. V. CHASE, Ottawa, Ont.  
*Dept. of the Interior.*
3. S. R. A. CLEMENT, 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
3. T. E. CORRIGAN, New Westminster, B.C.  
*Electrical Contractor.*
- 1.\*N. L. R. CROSBY, B.A.Sc., 95 King St. E., Toronto, Ont.  
*Contracting Engineer, Toronto Steel Const. Co.*
1. G. H. FERGUSON, B.A.Sc., Ottawa, Ont.  
*Engineer, Commission of Conservation.*
3. H. S. FIERHELLER, B.A.Sc. (deceased).
3. F. H. HARRISON, 320 Fifth Ave., New York, N.Y.  
*Engineer, H. D. Best Co.*
1. M. C. HENDRY, B.A.Sc., Morrisburg, Ont.  
*Engineer in Charge, Hydro-Electric Power Commission.*
2. C. S. L. HERTZBERG, Toronto, Ont.  
*Harkness, Loudon & Hertzberg.*
- 3.\*W. G. HEWSON, B.A.Sc., Toronto, Ont.  
*Hydro Electric Power Commission.*
1. G. S. JONES, Ottawa, Ont.  
*Topographical Surveys Br., Dept. of Interior.*

\*Diploma with honours.

## 1905—Continued.

3.*G. KRIBS, <i>Manager, Hespeler Mfg. Co.</i>	Hespeler, Ont.
2. P. A. LAING,	Dundas, Ont.
1. A. LATORNELL, B.A.Sc., <i>Engineer, Sewer Department, City Hall.</i>	Toronto, Ont.
3. J. W. LEIGHTON, <i>President, Leighton-Jackes Mfg. Co.</i>	Toronto, Ont.
1.*T. R. LOUDON, B.A.Sc., <i>Associate Professor of Ferro-Metallurgy, University of Toronto.</i>	Toronto, Ont.
3. S. E. McGORMAN, <i>Asst. Engineer, Canadian Bridge Co.</i>	Walkerville, Ont.
1.*W. W. McGREGOR (deceased).	
2. D. W. MCKENZIE, <i>Draftsman, Engineering Dept. C.N. Ry.</i>	Winnipeg, Man.
3.*C. A. MCLEAN. <i>Masco Co.</i>	Toronto, Ont.
2. W. N. MCLEAN,	Erin, Ont.
3. F. G. MACE, <i>Patent Examiner, Dept. of Agriculture.</i>	Ottawa, Ont.
3. R. W. MOFFATT, B.A.Sc., <i>University of Manitoba.</i>	Winnipeg, Man.
3. L. W. MORDEN, <i>Packard Electric Co.</i>	St. Catharines, Ont.
3. G. R. MUNRO, B.A.Sc., <i>c/o Wm. Hamilton Manufacturing Co.</i>	Peterborough, Ont.
3.*W. G. NICKLIN, B.A.Sc., <i>Assistant Superintendent, Dalnu &amp; Kiefer Tanning Co.</i>	Grand Rapids, Mich.
1. E. D. O'BRIEN, <i>Chief Engineer, Halifax Shipyards, Ltd., and Dartmouth Marine Ry.</i>	Halifax, N.S.
1.*B. B. PATTEN, B.A.Sc.,	St. George, Ont.
1. E. P. A. PHILLIPS, B.A.Sc., O.L.S., <i>Phillips &amp; Benner.</i>	Port Arthur, Ont.
1. W. B. PORTE,	Oakville, Ont.
2. E. F. PULLEN,	Oakville, Ont.
2. G. L. RAMSEY, B.A.Sc., <i>Ontario Land Surveyor.</i>	Sault Ste. Marie, Ont.
1. G. W. RAYNER, <i>Ontario Rock Co.</i>	Toronto, Ont.
3.*R. B. ROSS (deceased).	
5. T. E. ROTHWELL, B.A.Sc., <i>Provincial Assay Office.</i>	Toronto, Ont.
2.*G. S. SCOTT,	26 Howard St., Toronto, Ont.
3. H. V. SERSON,	Arnprior, Ont.
3. C. H. SHIRRIFF, B.A.Sc., <i>Chemist, Imperial Extract Co.</i>	Toronto, Ont.
3.*C. E. SISSON, <i>Canadian Gen. Electric Co.</i>	Peterboro', Ont.
1. D. L. N. STEWART, B.A.Sc.,	
1. M. A. STEWART, <i>Assistant Engineer, Roadway Dept., City Hall.</i>	Toronto, Ont.
3.*W. F. STUBBS, <i>Assistant Engineer, Goldie &amp; McCulloch Co.</i>	Galt, Ont.
1. N. H. STURDY, <i>Chief Engineer, Truscon Steel Co.</i>	Youngstown, O.

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 125

1905—Continued.

1. W. G. SWAN, B.A.Sc., C.E., New Westminster, B.C.  
*Chief Engineer, Vancouver Harbour Commission.*
- 1.\*F. H. SYKES, O. & D.L.S., Toronto, Ont.  
*City Architect's Dept., City Hall.*
3. L. R. THOMSON, B.A.Sc., Montreal, Que.  
*Lignite Utilization Board.*
3. E. D. TILLSON, B.A.Sc., 502 Webster Building, Chicago, Ill.  
1.\*J. J. TRAILL, B.A.Sc., C.E., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
- 1.\*W. M. TREADGOLD, B.A., Toronto, Ont.  
*Associate Professor in Surveying, University of Toronto.*
3. W. E. TURNER, B.A.Sc., Salt Lake City, Utah  
*With Utah Light & Ry. Co.*
3. A. E. UREN, Toronto, Ont.  
*Editor, Acton Publishing Co.*
3. J. M. VAUGHAN, 58 Melville Ave., Toronto, Ont.  
*Contractor.*
1. H. L. WAGNER, B.A.Sc., 76 Mavety St., Toronto, Ont.  
*Instructor, Invalided Soldiers' Commission.*
2. W. H. YOUNG, B.A.Sc., D.L.S., Calgary, Alta.  
*District Engineer.*

1906.

1. F. ALPORT, B.A.Sc., D.L.S., Orillia, Ont.  
3.\*W. L. AMOS, Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. A. H. ARENS, Orillia, Ont.  
3.\*J. C. ARMER, Toronto, Ont.  
*Sales Manager, Dominion Forge Co.*
1. M. H. BAKER, B.A.Sc., Toronto, Ont.  
*With Canadian Fire Underwriters Ass'n.*
3. F. W. BALDWIN, Hammondsport, N.Y.  
*With Dr. Graham Bell.*
2. E. W. BANTING, B.A.Sc., Toronto, Ont.  
*Lecturer in Surveying, University of Toronto.*
3. F. BARBER, 57 Adelaide St. East, Toronto, Ont.  
*York County Engineer.*
2. M. BATES, B.A.Sc. (deceased).
2. J. P. BELLISLE (deceased).
- 3.\*H. H. BETTS, B.A.Sc., Plaza Cataluna 2, Barcelona, Spain  
*Riegos y Fuerza del ebro.*
- 5.\*D. E. BEYNON, B.A.Sc., Toronto, Ont.  
*General Supt., Dunlop Tire and Rubber Goods Co.*
2. G. W. BISSETT, (deceased)
3. W. C. BLACKWOOD, B.A.Sc., Guelph, Ont.  
*Professor of Physics, Ontario Agricultural College.*
3. H. E. BRANDON, B.A.Sc., Toronto, Ont.
1. M. E. BRIAN, B.A.Sc., O.L.S., A.M.E.I.C., Windsor, Ont.  
*City Engineer.*
2. F. C. BROADFOOT, Vancouver, B.C.  
*Broadfoot, Johnston & Hamilton.*
2. T. W. BROWN, B.A.Sc., D. S. & A.L.S., A.M.E.I.C., Saskatoon, Sask.  
*Brown & Loucks, Civil Engineers.*

\*Diploma with honours.

## 1906—Continued.

1.*A. E. K. BUNNELL, B.A.Sc.,	Toronto, Ont.
<i>Engineer, Civic Transportation Committee.</i>	
3. F. M. BYAM,	Toronto, Ont.
<i>Chief Engineer, McGregor and McIntyre.</i>	
3. A. CAMERON,	Winnipeg, Man.
<i>Provincial Architect's Office.</i>	
3. A. W. CAMPBELL, B.A.Sc.,	Toronto, Ont.
1. M. J. CARROLL,	Ottawa, Ont.
<i>Topographical Surveys Branch, Department of the Interior.</i>	
3.*R. E. C. CHADWICK,	Montreal, Que.
<i>Eastern Manager, The Foundation Co., Ltd., of New York.</i>	
1.*G. T. CLARK, B.A. <sup>C.E.</sup>	Toronto, Ont.
<i>Designing Engineer, Toronto Harbour Commissioners.</i>	
3.*G. A. COLHOUN,	Hamilton, Ont.
<i>Draftsman, The Hamilton Bridge Works Co., Ltd.</i>	
1.*W. A. M. COOK, B.A.Sc.,	Toronto, Ont.
<i>Wm. F. Sparling &amp; Co.</i>	
1.*E. L. COUSINS, B.A.Sc.,	Toronto, Ont.
<i>General Manager, Harbour Commission.</i>	
4. A. G. CREIGHTON,	Prince Albert, Sask.
<i>McConnell, Creighton &amp; Strothers, Architects and Structural Engineers.</i>	
4. W. N. DANIELS,	Noble Road, Jenkintown, Pa.
3.*N. P. F. DEATH, B.A.Sc.,	Toronto, Ont.
<i>Superintendent, Leaside Engineering Corp.</i>	
3. C. S. DUNDASS, B.A.Sc.,	Lachine, Que.
<i>With Dominion Bridge Co.</i>	
3. S. L. FEAR,	659 Spadina Ave., Toronto, Ont.
<i>Mech. and Elec. Eng. and Contracting.</i>	
5.*C. C. FORWARD,	50 Bedford Row, Halifax, N.S.
<i>Inland Revenue Dept.</i>	
5. C. W. GRAHAM, B.A.Sc. (deceased).	
3. J. GRAY,	Toronto, Ont.
<i>Gray Ball Bearing Co.</i>	
1.*P. W. GREENE,	130 St George St., Toronto, Ont.
<i>C.E.,</i>	
3. C. B. HAMILTON, B.A.Sc.,	M.A.S.M.E., M.E.I.C., A.M.A.I.E.E.,
<i>President, Hamilton Gear Co., Ltd.</i>	M.S.A.E., Toronto, Ont.
1.*A. L. HARKNESS, B.A.Sc.,	
1.*R. L. HARRISON,	Toronto, Ont.
<i>Resident Engineer, C.N.R.</i>	
1. E. HARRISON, B.A.Sc.,	513 Beveridge Blk., Calgary, Alta.
<i>Consulting Civil Engineer and Surveyor.</i>	
3. J. C. HARTNEY, B.A.Sc. (Killed in action, France, 1918).	
1. S. HETT, B.A.Sc.,	LePas, Man.
<i>Locating Engineer of the Hudson Bay Ry.</i>	
3. C. R. HILLIS. (Killed in action, France, 1918).	
3. C. W. HOOKWAY, B.A.Sc.,	Hamilton, Ont.
<i>Westinghouse Mfg. Co.</i>	
3. R. H. HOPKIHS, B.A.Sc.,	Toronto, Ont.
<i>With Soldiers' Civil Re-establishment.</i>	
1.*R. S. HOUSTON,	Winnipeg, Man.
<i>With the Dominion Bridge Co.</i>	
2.*W. HUBER,	22 Yarmouth Rd., Toronto, Ont.
<i>Contractor.</i>	

\*Diploma with honours.

1906—Continued.

- 3.\*A. H. HULL, B.A.Sc., 190 University Ave., Toronto, Ont.  
*Engineer, Hydro-Electric Power Commission.*
3. W. C. JEPSON, Niagara Falls, Ont.  
*Welland Canal Office.*
- 1.\*C. JOHNSTON, B.A.Sc., Oakville, Ont.  
*Engineer, Toronto and York Radial Ry.*
1. G. R. JONES, B.A.Sc., Chung-King, China.  
*Business Agent, Canadian Methodist Mission.*
3. T. JONES, B.A.Sc. (Killed in action, France, 1916).
- 1.\*A. E. JUPP, B.A.Sc., 47 Sparkhall Ave., Toronto, Ont.  
*Mgr. and Sec., A. E. Jupp Const. Co., Ltd.*
3. J. D. KEPPIY (deceased).
5. H. M. LANCASTER, B.A.Sc., Toronto, Ont.  
*Chief Chemist, Provincial Board of Health Laboratory.*
1. J. L. LANG, B.A.Sc., D. & O.L.S., 20 Leopold St., Toronto, Ont.
3. A. P. LINTON, B.A.Sc., Regina, Sask.
- 4.\*A. WELLESLEY McCONNELL, B.A.Sc., Toronto, Ont.  
*Associate Professor of Architecture, University of Toronto.*
- 3.\*D. G. MCILWRAITH, Detroit, Mich.
2. J. A. MCKENZIE, Kerrisdale, B.C.  
*c/o J. A. McKenzie & Co.*
- 1.\*J. V. McNAB, Moose Jaw, Sask.  
*Resident Engineer, C.P.R.*
3. J. A. MCPHERSON, Toronto, Ont.
2. K. A. MACKENZIE, B.A.Sc., Toronto, Ont.  
*Teacher, Technical High School.*
1. W. C. MACKINNON, Lachine, P.Q.  
*Dominion Bridge Co.*
- 3.\*W. MACLACHLAN, B.A.Sc., 183 Carlton St., Toronto, Ont.  
*Electrical Employers Ass'n., and Hydro Electric Power Commission.*
- 3.\*D. W. MARRS, Erie, Pa.  
*Chief Engineer, Erie Steel Construction Co.*
3. W. A. MAXWELL, Winnipeg, Man.  
*Dominion Bridge Co.*
- 1.\*REV. J. MELLON MENZIES, B.A.Sc., D.L.S., North Honan, China  
*Missionary*
3. L. R. MILLER, B.A.Sc., Watrous, Sask.  
*Supt., Electric Light, Power and Traction Co.*
- 1.\*B. F. MITCHELL, B.A.Sc., Edmonton, Alta.  
*Municipal Engineer.*
1. F. F. MONTAGUE, Winnipeg, Man.
- 1.\*W. J. MOORE, O.L.S., Pembroke, Ont.  
*Morris & Moore, Land Surveyors and Architects.*
1. C. R. MURDOCK, B.A.Sc., Dundas, Ont.  
*Town Engineer.*
2. C. J. MURPHY, B.A.Sc., Nova Scotia Bank Bldg., St. Catharines,  
*Consulting Engineer.* Ont.
- 1.\*W. P. NEAR, B.A., B.A.Sc., St. Catharines, Ont.  
*City Engineer.*
2. A. R. NEELANDS, Hamiota, Man.
3. D. G. PARK, B.A.Sc., 92 Arlington St., Winnipeg, Man.  
*Engineer, Waldron Co., Ltd., Heating Engineers.*

\*Diploma with honours.

## 1906—Continued.

3. G. W. PATERSON, 800 Poyntz Ave., Manhattan, Kansas.  
 5. R. E. PETTINGILL, Port Colborne, Ont.  
*Chief Chemist, Canada Cement Co.*  
 2.\*R. C. PURSER, B.A.Sc., 21 Fifth Ave., Ottawa, Ont.  
*Office of Surveyor General.*  
 3. N. R. ROBERTSON, B.A.Sc., Walkerton, Ont.  
 1. J. O. RODDICK, B.A.Sc., Brantford, Ont.  
*Contractor.*  
 1. C. H. ROGERS, B.A.Sc., Peterborough, Ont.  
*Mgr., Peterborough Canoe Co.*  
 2.\*O. ROLFSON, M.A.Sc., D. & O.L.S., Toronto, Ont.  
*Demonstrator in Chemical Engineering and Applied Chemistry,*  
*University of Toronto.*  
 1. R. C. ROSS, B.A.Sc., Ottawa, Ont.  
*Department of the Interior.*  
 1. K. G. ROSS, Sault Ste. Marie, Ont.  
*Lang & Ross, Engineers and Surveyors.*  
 1.\*H. T. ROUTLY, O. & D.L.S., 109 Lytton Bl., Toronto, Ont.  
*Highway Engineer and Contractor.*  
 2. J. H. RYCKMAN, A.M.E.I.C., Chicago, Ill.  
*c/o Bureau of Engineering, Dept. of Public Works.*  
 3.\*W. K. SANDERS, 58 Webster St., West Newton, Mass.  
 1.\*W. A. SCOTT, B.A.Sc., D.L.S. (deceased).  
 1.\*W. M. STEWART, B.A.Sc., Saskatoon, Sask.  
*Phillips, Stewart & Lee.*  
 2. J. E. THOMSON, B.A.Sc., Toronto, Ont.  
*Lecturer in Mineralogy, University of Toronto.*  
 3.\*C. L. VICKERY (deceased).  
 5. W. E. WICKETT (deceased).  
 3.\*J. N. WILSON, B.A.Sc., Toronto, Ont.  
*Asst. Eng., Hydro-Electric Power Commission.*  
 3.\*E. M. WOOD, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*

## 1907.

- 3.\*F. G. ALLEN, B.A.Sc., 707 High Street, Easton, Pa.  
 1. F. J. ANDERSON, B.A.Sc. (Killed in action, Nov. 1917).  
 1. A. P. AUGUSTINE, Penticton, B.C.  
 1. O. B. BOURNE, Morrisburg, Ont.  
*Hydro-Electric Power Commission.*  
 3.\*H. D. BOWMAN, B.A.Sc., Y.M.C.A., Brooklyn, N.Y.  
 3. W. S. BRADY, B.A.Sc., 413 Palmerston Ave., Toronto, Ont.  
 1. G. H. BROUGHTON, 176 Montrose Ave., Toronto, Ont.  
 1. J. A. BROWN, B.A.Sc., Vancouver, B.C.  
*Trussed Concrete Steel Co.*  
 1. W. J. BRUCE, Sault Ste. Marie, Ont.  
*Dept. of Public Works.*  
 1. C. E. BUSH, B.A.Sc., 156 Geoffrey St., Toronto, Ont.  
 3. J. H. CASTER, Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1.\*E. CAVELL, Toronto, Ont.

\*Diploma with honours.

## 1907—Continued.

5. R. M. COLEMAN, <i>International Nickel Co.</i>	Copper Cliff, Ont.
1.*C. B. B. CONNELL,	St. Kitts, B.W.I.
3.*G. C. COWPER, B.A.Sc., <i>Topographical Surveys in Sask.</i>	Welland, Ont.
2. J. V. CULBERT, B.A.Sc., <i>Buffalo Mines.</i>	Cobalt, Ont.
3.*R. S. DAVIS, B.A.Sc., <i>Davis, Hartney &amp; Co.</i>	315 Rogers Bldg., Vancouver, B.C.
3. S. D. EVANS, B.A.Sc.,	Leamington, Ont.
3.*F. R. EWART, B.A.Sc., <i>Ewart &amp; Jacob</i>	Excelsior Life Building, Toronto, Ont.
1. G. R. S. FLEMING. (Killed in action, 1917).	
6. P. C. FUX, B.A.Sc., <i>With Waterous Engine Works Co.</i>	Brantford, Ont.
1. J. S. GALLETTY, B.A.Sc.,	Brooklin, Ont.
2. G. GALT, B.A.Sc. (Killed in action, France, 1916).	
1. A. B. GARROW, B.A.Sc.,	126 Avenue Rd., Toronto, Ont.
1. A. GILLIES, B.A.Sc.,	25 Rathnally Ave., Toronto, Ont.
1. G. W. GRAHAM,	Eugenia, Ont.
3. C. S. GRASSETT, B.A.Sc.,	Barrie, Ont.
1.*R. E. W. HAGARTY, B.A.Sc., <i>Industrial Engineer.</i>	662 Euclid Avenue, Toronto, Ont.
3. K. HALL, B.A.Sc.,	87 Sherman Ave. S., Hamilton, Ont.
1. C. T. HAMILTON, B.A.Sc., <i>Johnston and Hamilton.</i>	142 Hastings St. W., Vancouver, B.C.
3. R. A. HARE, <i>With Canadian Crocker Wheeler Co.</i>	St. Catharines, Ont.
1. H. F. H. HERTZBERG, <i>Colonel, Commanding Royal Canadian Engineers.</i>	Halifax, N.S.
3.*H. O. HILL, B.A.Sc.,	Aspinwall, Pa.
1.*T. H. HOGG, B.A.Sc., C.E., <i>Asst. Engineer, Hydro-Electric Power Commission.</i>	Toronto, Ont.
3.*C. H. HUTTON, B.A.Sc., <i>Engineering Staff, Dominion Power Co.</i>	Hamilton, Ont.
1. H. M. HYLAND, B.A.Sc., <i>Hyland Const. Co.</i>	72 St. Mary St., Toronto, Ont.
3. E. W. HYMAN, B.A.Sc., <i>Assistant Superintendent, London Electric Co.</i>	London, Ont.
3.*L. G. IRELAND, B.A.Sc., <i>Dist. Mgr., Hydro-Electric Power Commission.</i>	190 University Ave., Toronto, Ont.
1.*W. JACKSON, B.A.Sc., <i>Div. Engineer, Hydro-Electric Power Commission.</i>	Box 245, Niagara Falls, Ont.
4.*C. B. JACKSON, <i>Jackson-Lewis Co.</i>	Toronto, Ont.
3.*E. W. KAY, B.A.Sc., <i>Instructor, Technical School.</i>	Hamilton, Ont.
3. D. F. KEITH, B.A.Sc.,	199 Lyndhurst Ave., Toronto, Ont.
1. H. P. KEITH, <i>Smith &amp; Keith, Alta. Land Surveyors and Engineers.</i>	Edmonton, Alta.

1907—Continued.

- |  |                                       |
|--|---------------------------------------|
| 1. A. A. KINGHORN, B.A.Sc.,<br><i>Manager, Asphaltic Concrete Co. of Toronto, Ltd.</i>           | Toronto, Ont.                         |
| 1. L. W. KLINGER,  | 4 St. Anne's Rd., Toronto, Ont.       |
| 1.*F. C. LAMB, B.A.Sc.,<br><i>Phillips, Stewart &amp; Lee.</i>                                   | Saskatoon, Sask.                      |
| 3. A. D. LE PAN, B.A.Sc.,<br><i>Asst. Supt. of Buildings and Grounds, University of Toronto.</i> | Toronto, Ont.                         |
| 1. J. H. LINDSAY, S. & D. L. S.,<br><i>Dist. Surveyor and Engineer, Public Works Dept.</i>       | Prince Albert, Sask.                  |
| 3. J. A. D. McCURDY,<br><i>Curtiss Aeroplane Co.</i>   | Toronto, Ont.                         |
| 1.*J. B. MCFARLANE, B.A.Sc.,<br><i>Dominion Land Surveyor.</i>                                   | Lake Saskatoon, Alta.                 |
| 3.*D. J. McGUGAN, B.A.Sc.,<br><i>Burnett &amp; McGugan.</i>                                      | New Westminster, B.C.                 |
| 3. A. H. MCINTOSH,   | 59 Albany Ave., Toronto, Ont.         |
| 3. F. W. MCNEILL, B.A.Sc.,<br><i>Canadian General Electric Co.</i>                               | Calgary, Alta.                        |
| 1.*M. K. MCQUARRIE,<br><i>Engineer, D.A.R.</i>   | Kentville, N.S.                       |
| 1. A. G. MACKAY,<br><i>With Hudson &amp; Manhattan Ry. Co.</i>                                   | New York, N.Y.                        |
| 1. W. D. MACKENZIE,<br><i>Div. Engineer, Greater Winnipeg Water Dist.</i>                        | 501 Tribune Bldg., Winnipeg, Man.     |
| 1.*G. MACLEOD,   | 10126 124th Street, Edmonton, Alta.   |
| 1. W. S. MALCOLMSON, B.A.Sc.,<br><i>Engineer and Surveyor.</i>                                   | 163 Havelock Street, Toronto, Ont.    |
| 3. S. A. MARSHALL,   | Welland, Ont.                         |
| 6. D. H. C. MASON, B.A.Sc.,  | 295 Russell Hill Drive, Toronto, Ont. |
| 1. J. W. MELSON, B.A.Sc.,<br><i>Lecturer in Surveying, University of Toronto.</i>                | Toronto, Ont.                         |
| 1. G. G. MILLS, B.A.Sc.,<br><i>With Soldiers' Civil Re-establishment.</i>                        | Montreal, Que.                        |
| 3. J. B. MINNS, B.A.Sc.,<br><i>Canadian General Electric Co.</i>                                 | Toronto, Ont.                         |
| 4.*G. N. MOLESWORTH,   | 3 Hawthorne Ave., Toronto, Ont.       |
| 1. J. M. MOORE, B.A.Sc.,<br><i>With McClary Mfg. Co.</i>   | London, Ont.                          |
| 5.*P. F. MORLEY,<br><i>Chemist, Provincial Board of Health Laboratory.</i>                       | Toronto, Ont.                         |
| 1. E. W. MURRAY, B.A.Sc.,<br><i>Dept. of Public Works.</i>                                       | Regina, Sask.                         |
| 3. J. D. MURRAY.   | Toronto, Ont.                         |
| 1. E. W. NEELANDS, B.A.Sc.,<br><i>Sutcliffe &amp; Neelands, Consulting Engineers.</i>            | New Liskeard, Ont.                    |
| 1. R. E. K. NEELANDS, B.A.Sc.,   | Box 163, Guelph, Ont.                 |
| 2.*B. NEILLY, B.A.Sc., M.E.,<br><i>Manager, Penn-Canadian Mines.</i>                             | Cobalt, Ont.                          |
| 1. A. E. NOURSE, B.A.Sc.,  | Toronto, Ont.                         |
| 3. J. J. O'SULLIVAN,<br><i>Canada Railway News Co.</i>   | 21 Thorburn Ave., Toronto, Ont.       |
| 2. T. K. PATON,<br><i>Mining Engineer.</i>   | Wardner, Ida.                         |

\*Diploma with honours.

## 1907—Continued.

1. F. W. PAULIN, O.L.S., <i>Contractor.</i>	Bank of Hamilton Bldg., Hamilton, Ont.
1. R. B. POTTER, B.A.Sc., <i>Asst. Engineer, Roadways Dept., City Hall.</i>	235 Garden Ave., Toronto, Ont.
3.*F. E. PROCHNOW, B.A.Sc. <i>With Wilhelm, Parker &amp; Ward, Patent Attorneys.</i>	Buffalo, N.Y.
3.*J. F. PROCUNIER,	1232 Victoria Ave., Vancouver, B.C.
3. G. E. QUANCE, B.A.Sc., <i>Quance Bros. Ltd.</i>	Delhi, Ont.
3.*H. RAINES, <i>With Prack &amp; Perrine, Architects and Engineers.</i>	Toronto, Ont.
1.*J. L. RANNIE, B.A.Sc., <i>Observer, Geodetic Survey.</i>	Ottawa, Ont.
3. C. W. B. RICHARDSON, B.A.Sc., <i>Dominion Bridge Co.</i>	Toronto, Ont.
1. A. A. RIDLER, <i>Supl. Constructing &amp; Paving Co., Ltd.</i>	Toronto, Ont.
5. H. E. ROTHWELL, B.A.Sc., <i>Chief Chemist, Harris Abattoir Co.</i>	Toronto, Ont.
5. C. A. SCHOFIELD, <i>Chemist, Schoellkopf-Hartford &amp; Hanna Co.</i>	Buffalo, N.Y.
1.*A. C. T. SHEPPARD, <i>Geological Survey.</i>	Ottawa, Ont.
1. F. R. SMITH, B.A., 3. E. R. SMITHRIM, B.A.Sc., 1.*W. SNAITH, <i>Asst. Eng., F. Barber.</i>	Vancouver, B.C. Strathroy, Ont. 40 Jarvis St., Toronto, Ont.
3. A. C. SPENCER, B.A.Sc., 3. G. S. STEWART, <i>Sales Engineer, Canadian General Electric Co.</i>	London, Ont. Toronto, Ont.
1. J. A. STILES, B.A.Sc., <i>Professor of Civil Engineering, University of N.B.</i>	Fredericton, N.B.
3.*J. L. STIVER, 1. J. L. C. STUART, B.A.Sc., <i>The Pedlar People Limited.</i>	Toronto, Ont. Oshawa, Ont.
1. G. F. SUMMERS, O.L.S., <i>Routly &amp; Summers, Engineers and Surveyors.</i>	Haileybury, Ont.
1.*H. W. SUTCLIFFE, <i>Sutcliffe &amp; Neelands, Consulting Engineers.</i>	New Liskeard, Ont.
1. P. M. THOMPSON, B.A.Sc., <i>Office of City Architect.</i>	54 Thorold St., Toronto, Ont.
3. O. R. THOMSON, B.A.Sc., <i>The Electric Power Co.</i>	Trenton, Ont.
1. L. R. THOMSON, B.A.Sc., <i>Lignite Utilization Board.</i>	Montreal, Que.
1. W. J. WALKER, <i>With Transcontinental Ry.</i>	Grant, Ont.
1. E. D. WILKES, B.A.Sc., <i>Main Drainage Department, City Hall.</i>	Toronto, Ont.
3. A. F. WILSON, B.A.Sc., <i>With Cleveland Telephone Co.</i>	Cleveland, Ohio.
3. M. H. WOODS, B.A.Sc., 1. G. W. A. WRIGHT, <i>Supervisor of Prod'n's., Imperial Munitions Bd.</i>	Aylmer West, Ont. 65 Oakmount Bl., Toronto, Ont.

\*Diploma with honours.

## 1907—Continued.

3. J. YOUNG, Box 2973, Winnipeg, Man.  
*Chief Inspector, Western Canada Fire Underwriters' Association.*
- 3.\*A. R. ZIMMER, B.A.Sc., Toronto, Ont.  
*Lecturer in Electrical Engineering, University of Toronto.*

## 1908.

3. H. G. AKERS, B.A.Sc. (deceased).
3. L. F. ALLAN, 58 Wychwood Ave., Toronto, Ont.
- 1.\*C. B. ALLISON, O.L.S., South Woodslee, Ont.
- 1.\*R. M. ANDERSON, B.A.Sc., Burlington, Ont.
5. R. J. ARENS, B.A.Sc., Akron, O.  
*Supt., Firestone Tire & Rubber Co.*
3. H. C. BARBER, B.A.Sc., Toronto, Ont.  
*Standard Underground Cable Co.*
1. E. BARTLETT, B.A.Sc., Medicine Hat, Alta.  
*Surveyor and Civil Engineer.*
2. F. J. BEDFORD (deceased).
- 1.\*G. G. BELL, Sewickley, Pa.
3. G. E. BLACK, B.A.Sc., Toronto, Ont.  
*Provincial Secretary's Office.*
3. H. F. BOWES, Toronto, Ont.
- 3.\*J. H. BRACE, Montreal, P.Q.  
*Traffic Engineer, Bell Telephone Co.*
1. P. R. BRECKEN, B.A.Sc., Calgary, Alta.  
*Manufacturer's Agency.*
3. E. I. BROWN, 111 Broadway, New York, N.Y.  
*Mgr., Mora & Mendoza.*
1. W. F. M. BRYCE, Ottawa, Ont.  
*Assistant Engineer, City Engineer's Department.*
3. P. H. BUCHAN, B.A.Sc., Vancouver, B.C.
2. J. E. CAMPBELL, B.A.Sc., Coldstream, Ont.
3. N. A. CAMPBELL, 629 4th Street, Edmonton, Alta.
3. A. M. CARROLL, Toronto, Ont.
1. H. R. CARSALLEN, B.A.Sc., 341 Markham Street, Toronto, Ont.
3. G. CHALLEN, Chedoke P.O., Hamilton, Ont.  
*With White Truck Co.*
1. F. H. CHESNUT, San Francisco, Cal.  
*With White Truck Co.*
1. W. E. COLE (deceased).
- 4.\*W. C. COLLETT, B.A.Sc., Toronto, Ont.  
*Construction Engineer, British Acetones, Toronto, Ltd.*
1. R. Y. CORY, B.A.Sc., 5 Deer Park Cres., Toronto, Ont.
- 3.\*H. COYNE, B.A.Sc., Racine, Wisc.  
*With Thomas & Thomas.*
- 2.\*J. D. CUMMING, B.A.Sc., 61 E. Jefferson Ave., Detroit, Mich.  
*Mgr., Detroit Spring Co.*
6. A. D. DAHL, B.A.Sc., Midland, Mich.  
*Chemist, Dow Chemical Co.*
1. F. A. DANKS, Toronto, Ont.  
*Advertising Dept., "Canadian Engineer."*
3. J. DARROCH, Detroit, Mich.  
*Draftsman, Autoparts Mfg. Co.*
3. H. C. DOORLY (deceased).
2. R. H. DOUGLAS, Edmonton, Alta.  
*Department of Public Works.*

\*Diploma with honours.

## 1908—Continued.

2.*F. C. DYER, B.A.Sc., <i>Lecturer in Mining Engineering, University of Toronto.</i>	Toronto, Ont.
1. F. M. EAGLESON, <i>Engineer and Surveyor.</i>	Winchester, Ont.
1. C. EDWARDS, B.A.Sc.,	158 Dowling Ave., Toronto, Ont.
1. S. L. EVANS, B.A.Sc., <i>Dominion Land Surveyor</i>	Corinth, Ont.
1. E. O. EWING, B.A.Sc. <i>With Harkness, Loudon &amp; Herzberg.</i>	Toronto, Ont.
1. O. L. FLANAGAN, B.A.Sc., <i>Engineer.</i>	Cobalt, Ont.
1. C. FLINT, B.A.Sc.,	Winnipeg, Man.
1. A. H. FOSTER, B.A.Sc., <i>With Guelph St. Ry.</i>	Guelph, Ont.
3. G. C. FRANCIS, <i>With Canadian Fire Underwriters Ass'n.</i>	Toronto, Ont.
3. S. S. GEAR,	St. Catharines, Ont.
1. C. A. GRASSIE, B.A.Sc., <i>With Kennedy &amp; Sons.</i>	Collingwood, Ont.
3.*C. L. GULLEY, B.A.Sc., <i>Gen. Manager, Superior Electrics, Ltd.</i>	Pembroke, Ont.
3. J. W. HACKNER, B.A.Sc., <i>Asst. Engineer, Dept. of Public Works.</i>	Toronto, Ont.
3. F. L. HAVILAND, <i>Draftsman, Hamilton Bridge Works Co.</i>	Hamilton, Ont.
1.*C. D. HENDERSON, <i>Canadian Bridge Co.</i>	Walkerville, Ont.
1. E. G. HEWSON, <i>Division Engineer, Grand Trunk Ry.</i>	603 Union Station, Toronto, Ont.
5.*D. J. HUEETHER, B.A.Sc., <i>With Dunlop Tire and Rubber Co.</i>	Toronto, Ont.
1. A. D. HUEETHER, B.A.Sc.,	47 Highview Cres., Toronto, Ont.
3.*A. N. HUNTER, B.A.Sc., <i>With Hydro-Electric Power Commission.</i>	71 Sherwood Ave., Toronto, Ont.
3. S. B. ILER, <i>Asst. Eng., Hydro-Electric Power Commission.</i>	190 University Ave., Toronto, Ont.
1.*J. T. JOHNSTON, B.A.Sc., <i>Asst. Director, Water Power Branch, Dept. of the Interior.</i>	Ottawa, Ont.
2. H. G. KENNEDY, B.A.Sc., <i>O'Brien Mine.</i>	Cobalt, Ont.
1.*W. R. KEYS, <i>T. &amp; N. O. Ry.</i>	North Bay, Ont.
3. W. C. KILLIP, <i>With W. J. Westaway &amp; Co.</i>	Hamilton, Ont.
3.*J. N. M. LESLIE, B.A.Sc., <i>With Canadian Westinghouse Co.</i>	Toronto, Ont.
3. F. C. LEWIS, <i>Jackson-Lewis Co.</i>	Toronto, Ont.
3. H. R. LYNAR, <i>Welland Ship Canal Office.</i>	St. Catharines, Ont.
1.*W. G. McGEOERGE, <i>Consulting Engineer.</i>	Chatham, Ont.

\*Diploma with honours.

## 1908—Continued.

1. J. M. McGREGOR,  
*McCubbin & McGregor.* Chatham, Ont.
1. L. A. MCLEAN, B.A.Sc. (deceased). Prince Albert, Sask.
1. W. A. A. McMMASTER, A.S. & D.L.S., Walkerville, Ont.
1. H. C. McMORDIE, B.A.Sc.,  
*Chief Engineer, Trussed Concrete Steel Co.*
- 1.\*A. A. McROBERTS, B.A.Sc.,  
*T. & N. O. Ry.* North Bay, Ont.
- 5.\*N. G. MADGE, 406 West 5th Ave., Roselle, N.J.
3. J. E. MALONE, B.A.Sc., Chicago, Ill.  
*With Illinois Steel Co.*
5. K. D. MARLATT, Oakville, Ont.  
*Marlatt & Armstrong Tanning Co.*
1. R. J. MARSHALL, B.A.Sc., Toronto, Ont.  
*Canadian Inspection & Testing Laboratories, Ltd.*
5. G. L. MILLIGAN, B.A.Sc., Brampton, Ont.
1. A. B. MITCHELL, Orillia, Ont.  
*With N. MacLeod, Contractor.*
- 4.\*J. C. P. MOLESWORTH (deceased). Cincinnati, Ohio
3. E. D. MONK, B.A.Sc.,  
*General Electric Co.*
- 3.\*F. H. MOODY, B.A.Sc., Oshawa, Ont.  
*McLaughlin Motor Car Co.*
3. J. H. MORICE, B.A.Sc., San Francisco, Cal.  
*With General Electric Co.*
3. F. E. H. MOWBRAY, B.A.Sc., Hamilton, Ont.  
*Canadian Westinghouse Co.*
- 3.\*W. P. MURRAY, B.A.Sc., St. Paul's Station, Ont.
3. W. de C. O'GRADY, Toronto, Ont.  
*With Steel & Radiation.*
1. H. J. PECKOVER, B.A.Sc., 103 Cowan Ave., Toronto, Ont.  
*Draughtsman, City Hall.*
- 1.\*M. PEQUEGNAT, B.A.Sc., Kitchener, Ont.  
*Superintendent of Water Works.*
1. H. G. PHILLIPS, D. & S.L.S., Regina, Sask.  
*Smith & Phillips, Civil Engineers.*
3. M. PIVNICK, B.A.Sc., Toronto, Ont.  
*Dentist.*
- 1.\*E. M. PROCTOR, B.A.Sc., Toronto, Ont.  
*Mgr., E. A. James & Co., Ltd.*
- 3.\*C. F. PUBLOW, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. J. T. RANSOM, B.A.Sc., D. & O.L.S., 242 Lauder Ave., Toronto, Ont.  
*Demonstrator in Surveying, University of Toronto,*
- 1.\*W. B. REDFERN, B.A.Sc., Toronto, Ont.  
*Sec.-Treas., E. A. James & Co., Ltd.*
1. F. L. RICHARDSON, B.A.Sc., Toronto, Ont.  
*With Miller, Cummings & Robertson.*
3. H. A. RICKER, B.A.Sc., Hamilton, Ont.  
*Designer, Canadian Westinghouse Co.*
1. A. R. ROBERTSON, B.A.Sc., 1139 Shaw St., Toronto, Ont.  
*Sales Eng., McGregor & McIntyre, Ltd.*
5. F. A. ROBERTSON, 190 University Ave., Toronto, Ont.  
*Asst. Eng., Hydro-Electric Power Commission.*

\*Diploma with honours.

1908—Continued.

- |  |  |
|--|--|
| 1.*W. A. ROBINSON,<br><i>Right-of-Way Surveyor, C.P.R.</i>   | Winnipeg, Man.   |
| 3. R. C. ROBINSON,<br><i>With C. N. Ry.</i>  | Winnipeg, Man.   |
| 5. L. J. ROGERS, B.A.Sc.,<br><i>Assistant Professor in Analytical Chemistry, University of Toronto.</i>                      | Toronto, Ont.  |
| 2.*R. R. ROSE, B.A.Sc.,<br><i>Asst. Secy., Canadian Mining Institute.</i>  | Drummond Bldg., Montreal, Que.                                       |
| 1. A. O. SECORD,<br>3. W. E. V. SHAW, B.A.Sc.,<br>3. H. F. SHEARER, B.A.Sc.,<br><i>With Hydro-Electric Power Commission.</i> | Brantford, Ont.<br>750 Summit Ave., Milwaukee, Wis.<br>Toronto, Ont. |
| 1. W. L. STAMFORD, B.A.Sc.,<br><i>Inspector on Concrete Work, Hydro-Electric Power Plant.</i>                                | Point du Bois, Man.  |
| 3. R. H. STARR, B.A.Sc.,<br><i>Engineer.</i>   | Orillia, Ont.  |
| 3. A. W. J. STEWART,<br><i>Toronto Hydro-Electric System.</i>  | Toronto, Ont.  |
| 3. J. ST. LAWRENCE,<br><i>General Electric Co.</i>   | Erie, Pa.  |
| 1. J. J. STOCK, D.L.S.,<br><i>Topographical Surveys, Dept. of the Interior.</i>  | 448 Cooper St., Ottawa, Ont.   |
| 1. H. B. STUART, B.A.Sc.,<br>2. J. L. G. STUART, B.A.Sc.,<br><i>The Pedlar People Limited.</i>                               | 64 Hughson St., Hamilton, Ont.<br>Oshawa, Ont.                       |
| 3. A. D. SWORD, B.A.Sc.,<br><i>With Canadian Milk Products.</i>  | Woodstock, Ont.  |
| 3. J. W. R. TAYLOR, B.A.Sc.,<br><i>Sales Eng., Canadian Westinghouse Co.</i>   | Toronto, Ont.  |
| 1.*W. E. TAYLOR, B.A.Sc.,<br><i>York County Engineer's Office.</i>   | 323 Glen Road, Toronto, Ont.   |
| 3. V. C. THOMAS, B.A.Sc.,<br><i>Contractor.</i>  | 34 McRae St., Niagara Falls, Ont.                                    |
| 1. J. H. THORNLEY, B.A.Sc.,<br>1. C. G. TOMS, B.A.Sc.,<br><i>General Manager, Toms Contracting Co., Ltd.</i>                 | Dundas St., London, Ont.<br>56 Spencer Ave., Toronto, Ont.           |
| 1. H. W. TYE,<br>3. C. P. VAN NORMAN, B.A.Sc.,<br><i>Toronto &amp; York Radial Ry.</i>                                       | Balcarres, Sask.<br>Toronto, Ont.                                    |
| 1. T. L. VILLENEUVE,<br><i>Assistant Engineer, Dept. of Public Works.</i>  | Chicoutimi, Que.   |
| 1. J. A. WALKER, B.A.Sc., B.C.L.S.,<br><i>Inspector Artillery Stores, Militia Dept.</i>                                      | Ottawa, Ont.   |
| 3.*B. W. WAUGH, B.A.Sc.,<br>3. R. M. WEDLAKE, B.A.Sc.,<br><i>With Cockshutt Plow Co., Ltd.</i>                               | Kitchener, Ont.<br>Brantford, Ont.                                   |
| 3. R. P. WEIR,<br><i>Eng. Dept., Cutter Elec. and Mfg. Co.</i>   | 923 Bank of Hamilton Bldg., Toronto, Ont.                            |
| 1. A. M. WEST, B.A.Sc.,<br>1. W. R. WHITE,<br><i>Chief Surveyor's Office, Dept. of Indian Affairs.</i>                       | N. Vancouver, B.C.<br>Ottawa, Ont.                                   |
| 3. W. J. WHITE, B.A.Sc.,<br><i>With British Thomson Houston Co.</i>  | Perth, Australia.  |

\*Diploma with honours.

1908—Continued.

- 3.\*F. D. WILSON, B.A.Sc.,  
 Austin Co., 1374 Continental & Commercial National Bank  
 Bldg., Chicago, Ill.  
 1. J. M. WILSON,  
*District Engineer, Dept. of Public Works of Canada.* Toronto, Ont.  
 1. D. O. WING,  
*City Engineer's Office.* Vancouver, B.C.  
 3.\*R. YOUNG,  
*With B.C. Electric Railway Co.* Vancouver, B.C.

1909.

- |  |                                       |
|--|---------------------------------------|
| 3. E. G. ARENS,<br><i>E. Long Mfg. Co.</i>   | Orillia, Ont.                         |
| 3. H. V. ARMSTRONG,<br><i>With Hydro-Electric Power Commission.</i>                          | Toronto, Ont.                         |
| 2.*E. T. AUSTIN, B.A.Sc.,<br><i>With the Mond Nickel Co.</i>                                 | Coniston, Ont.                        |
| 3. W. H. BARRY, B.A.Sc.,<br><i>Firestone Fire &amp; Rubber Co.</i>                           | Hamilton, Ont.                        |
| 3. R. D. S. BECKSTEDT, B.A.Sc.,  | Lacolle, Que.                         |
| 3. R. E. BEITH,  | 174 Howland Ave., Toronto, Ont.       |
| 1.*G. A. BENNETT, B.A.Sc., C.E.,<br><i>Topographical Surveys Br., Dept. of the Interior.</i> | Ottawa, Ont.                          |
| 3. E. R. BIRCHARD, B.A.Sc.,<br><i>Republic Motor Car Co.</i>                                 | Toronto, Ont.                         |
| 3. W. D. BLACK, B.A.Sc.,<br><i>Supt., Otis-Fensom Elevator Co., Ltd.</i>                     | Toronto, Ont.                         |
| 3.*D. C. BLIZARD, B.A.Sc.,<br><i>El Aquila Refinery.</i>                                     | Tampico, Mexico.                      |
| 1.*W. J. BOULTON, B.A.Sc.,<br><i>Surveyor, Dept. of Interior.</i>                            | Ottawa, Ont.                          |
| 3. G. H. BOWEN, B.A.Sc.,<br><i>Chief Engineer, Dominion Glass Co.</i>                        | Wallaceburg, Ont.                     |
| 3. C. E. BROWN, B.A.Sc.,<br><i>Sales Correspondent, Canadian Westinghouse Co.</i>            | Hamilton, Ont.                        |
| 1. E. W. BROWNE, B.A.Sc.,  | 247 Cannon St. E., Hamilton, Ont.     |
| 1. J. A. BUCHANAN,<br><i>With Permanent Construction Co.</i>                                 | 140 Jasper West, Edmonton, Alta.      |
| 3. J. E. BURNS, B.A.Sc.,<br><i>Greenway Press.</i>   | 231 Seaton St., Toronto, Ont.         |
| 1. M. G. CAMERON, B.A.Sc.,   | Peterboro', Ont.                      |
| 3.*R. A. CAMPBELL,<br><i>With the Great Lakes Power Co., Ltd.</i>                            | Sault Ste. Marie, Ont.                |
| 1. V. S. CHESNUT, B.A.Sc.,<br><i>With St. John Dry Dock Co.</i>                              | East St. John, N.B.                   |
| 1.*C. G. CLINE, B.A.Sc.,<br><i>Division Engineer, B.C. Hydrometric Survey.</i>               | Kamloops, B.C.                        |
| 1. J. G. COLLINSON, B.A.Sc.,<br><i>Welland Ship Canal.</i>                                   | Port Weller, Ont.                     |
| 1. G. W. COLTHAM, B.A.Sc.,   | Aurora, Ont.                          |
| 3.*H. A. COOCH, B.A.Sc.,<br><i>Sales Eng., Canadian Westinghouse Co.</i>                     | Bank of Hamilton Bldg., Toronto, Ont. |
| 3. W. E. CORMAN,<br><i>Corman Eng. Co.</i>   | 58 Stewart St., Ottawa, Ont.          |

\*Diploma with honours.

1909—Continued.

3. T. H. CROSBY, B.A.Sc., Vancouver, B.C.  
*Sales Engineer, Canadian Westinghouse Co.*
3. R. H. CUNNINGHAM, Ouelette Ave., Windsor, Ont.
- 1.\*F. A. DALLYN, B.A.Sc., C.E., Toronto, Ont.  
*Sanitary Engineer, Provincial Board of Health Laboratory.*
3. C. N. DANKS, Sherbrooke, Que.  
*Asst. Engineer, Canadian Ingersoll Rand Co., Ltd.*
1. E. M. DANN. (Died of wounds received in action, France, 1916).
3. H. W. DAVIS, Kingston, Ont.  
*With A. Davis & Son, Ltd., Leather Manufacturers.*
- 2.\*A. I. DAVIS, B.A.Sc.,  
*On Overseas Service.*
1. H. C. DAVIS, Burlington, Ont.  
 1. I. H. DAWSON. (Died of wounds received in action, 1918).
3. W. H. DELAHAYE, B.A.Sc., Ottawa, Ont.
3. W. P. DERHAM, B.A.Sc., Renfrew, Ont.  
*M. J. O'Brien, Ltd.*
- 5.\*W. A. DODDS, B.A.Sc., Syracuse, N.Y.  
*Chief Chemist, Penman-Littlehales Chemical Co.*
1. R. H. DOUGLAS, Edmonton, Alta.  
*Department of Public Works.*
6. A. R. DUFF, 211 Fern Ave., Toronto, Ont.
1. M. O. DUFF, 4 Hughson St. S., Hamilton, Ont.
2. L. J. DUTHIE, 33 High Park Gardens, Toronto, Ont.
1. F. S. FALCONER, B.A.Sc., Ottawa, Ont.  
*Geological Survey Br., Dept. of Interior.*
3. T. A. FARGEY, B.A.Sc., 70 Eaton Place, East Orange N.J.,
1. J. B. FERGUSON, B.A.Sc., Cheyenne, Wyoming.  
*c/o Div. Engineer, V.P.R.R.*
3. A. T. FERGUSSON, B.A.Sc., 70 Madison Ave., Toronto, Ont.
3. T. E. FREEMAN, B.A.Sc., Hamilton, Ont.  
*Manager, Canada Steel Goods Co., Ltd.*
3. E. R. FROST, B.A.Sc., Cincinnati, Ohio.  
*With Proctor & Gamble Co.*
1. A. E. GLOVER, B.A.Sc., Edmonton, Alta.  
*Permanent Construction Co.*
5. A. E. GOODERHAM, Toronto, Ont.  
*With Gooderham & Worts.*
1. D. A. GRAHAM, B.A.Sc., Vernon, B.C.
2. R. R. GRANT, 961½ Gerrard St. E., Toronto, Ont.  
*Contractor,*
1. J. E. GRAY, B.A.Sc., Saskatoon, Sask.  
*c/o Morphy & Underwood.*
1. G. E. D. GREENE, B.A.Sc., 3 Hoskin Ave., Toronto, Ont.
1. W. H. GREENE, Moose Jaw, Sask.  
*Assistant City Engineer.*
1. W. W. GUNN, B.A.Sc., 20 Glenwood Ave., Toronto, Ont.
3. F. G. HAGEMAN, 1780 Urbana Rd., Cleveland, Ohio.
3. C. J. HARPER, Collingwood, Ont.  
*Engineer and Surveyor.*

\*Diploma with honours.

## 1909—Continued.

1. D. W. HARVEY, B.A.Sc.,  
Works Dept., City Hall. Toronto, Ont.
1. C. O. HAY (deceased).
- 3.\*J. HEMPHILL,  
*Construction Engineer, Algoma Steel Corp., Mines Dept.* Magpie Mine, Ont.
- 1.\*G. HOGARTH,  
*Chief Engineer of Highways, Dept. of Public Works of Ontario.* Toronto, Ont.
3. A. E. HOLMES, B.A.Sc.,  
*Knight Metal Products.* Toronto, Ont.
3. C. R. HOLMES, B.A.Sc., Chatham, Ont.
1. G. C. HOSHAL, B.A.Sc.,  
*Wells & Gray.* Toronto, Ont.
3. C. HUGHES, B.A.Sc. (killed in action, France, 1915).
1. A. E. HUNTER, B.A.Sc. (deceased).
3. H. IRWIN, B.A.Sc.,  
*Mgr., Greenway Press.* 2 Triller Ave., Toronto, Ont.
3. J. ISBISTER, B.A.Sc.,  
*Onaway Electric Light and Power Co.* Onaway, Mich.
3. F. P. JACKES, B.A.Sc. (killed in action, France, 1918).
- 1.\*J. E. JACKSON,  
164 Cumberland Ave., Hamilton, Ont.
1. E. W. JAMES, B.A.Sc.,  
*Bridge Engineer, Manitoba Government.* Winnipeg, Man.
- 1.\*C. C. JOHNSON, B.A.Sc., Wallaceburg, Ont.
1. C. E. JOHNSTON, B.A.Sc. (deceased).
1. W. J. JOHNSTON,  
*Mackenzie, Broadfoot & Johnston.* Vancouver, B.C.
- 1.\*A. H. E. KEFFER,  
*E. A. James & Co.* Toronto, Ont.
3. J. B. O. KEMP, B.A.Sc.,  
*On Staff, Ridley College.* St. Catharines, Ont.
3. W. R. KEY, B.A.Sc.,  
*Asst. Engineer, Turnbull Elevator Co.* Toronto, Ont.
5. H. N. KLOTZ, B.A.Sc. (Killed in action, France, 1915).
3. A. W. LAMONT, B.A.Sc.,  
*Canadian Westinghouse Co.* Winnipeg, Man.
- 3.\*C. B. LANGMUIR, B.A.Sc.,  
*Manager, Electrical Dept., Factory Products, Ltd.* Toronto, Ont.
3. A. E. LENNOX, B.A.Sc.,  
*National Lamp Works of General Electric Co.* Cleveland, Ohio
- 1.\*R. W. E. LOUCKS,  
*Provincial Surveys Branch.* Regina, Sask.
1. N. C. A. LLOYD,  
*Brown & Brown, Surveyors.* Toronto, Ont.
3. E. D. MACFARLANE, B.A.Sc., Houston, Texas
1. J. G. MACKINNON, Caledonia, Ont.
1. W. A. MACLACHLAN, B.A.Sc., Guelph, Ont.
3. B. A. MACLEAN, B.A.Sc., Orillia, Ont.
1. N. W. MACPHERSON, B.A.Sc., Edmonton, Alta.  
*Dept. of Public Works.*
3. D. D. McALPINE, B.A.Sc.,  
*Canadian General Electric Co.* 212 King St. W., Toronto, Ont.
1. A. S. MCARTHUR, B.A.Sc., 150 Redpath Ave., Toronto, Ont.

\*Diploma with honours.

1909—Continued.

3. C. R. MCCOLLUM, B.A.Sc., Wainfleet, Ont.  
 3.\*A. S. McCORDICK, B.A.Sc., Winnipeg, Man.  
 3. P. J. McCUAIG, B.A.Sc., Gamebridge, Ont.  
 3. W. G. McINTOSH, B.A.Sc., Toronto, Ont.  
*Willys-Overland, Ltd.*
1. F. H. MCKEHNIE, B.A.Sc., Montreal, Que.  
 3. J. H. MCKNIGHT, Simcoe, Ont.  
 3. G. MCLEOD, Waupaca, Wis.  
*Electrician, Electric Light & Ry. Co.*
1. V. McMILLAN, B.A.Sc., Toronto, Ont.  
*With Harkness, Loudon & Hertzberg.*
- 3.\*A. L. MALCOLM, B.A.Sc., Dalhousie Lake P.O., Ont. (via Sharbot Resident Engineer, Hydro-Electric Power Commission. Lake).  
 3. N. H. MANNING, B.A.Sc., Springfield, Ill.  
*With Rolls-Royce of America, Inc.*
- 1.\*A. B. MANSON, B.A.Sc., A.M.E.I.C., Stratford, Ont.  
*City Engineer.*
1. E. S. MARTINDALE, B.A.Sc., Aylmer, Ont.  
*Dominion Land Surveyor.*
1. O. W. MARTYN, B.A.Sc., D. & S.L.S., Box 54, Swift Current, Sask.  
 2. C. A. MORRIS, B.A.Sc., 128 Park Road, Toronto, Ont.  
 3. G. MORTON, B.A.Sc., Calgary, Alta.  
*Electrical Engineers, Ltd.*
- 1.\*F. V. MUNRO, B.A.Sc., Chatham, Ont.  
 1. E. A. NEVILLE, B.A.Sc., Prince George, B.C.  
 1. J. NEWTON, B.A.Sc., 361 London Road, Sarnia, Ont.  
*Sarnia Woollen Mills.*
- 3.\*L. S. ODELL, 183 Lauder Ave., Toronto, Ont.  
 3. V. J. O'DONNELL, B.A.Sc., R. 725, Power Bldg., Montreal, Que.  
 3. J. J. O'HEARN, Toronto, Ont.  
*Rose & O'Hearn.*
1. A. W. PAE, Edmonton, Alta.  
 1.\*A. M. PETRY, B.A.Sc., Toronto, Ont.  
*With Chas. Potter.*
- 3.\*W. M. PHILP, B.A.Sc., Niagara Falls, Ont.  
*Hydro Electric Power Commission.*
1. R. B. PIGOTT, B.A.Sc., 157 Wentworth St., Hamilton, Ont.  
 2. G. M. PONTON, Ottawa, Ont.  
*Canadian Trade Commission Representative.*
- 3.\*C. J. PORTER, B.A.Sc., Dallas, Texas.  
*With Texas Power and Light Co.*
3. A. I. PROCTOR, 852 King St. E., Hamilton, Ont.  
 1. J. QUAIL, Winnipeg, Man.  
*Canadian Bridge Co.*
1. A. F. RAMSPERGER, Toronto, Ont.  
*With Canada Foundry Co.*
- 1.\*C. R. REDFERN, B.A.Sc., Toronto, Ont.  
*Engineer, P. Lyall & Sons, Ltd., Contractors.*
- 3.\*L. T. RUTLEDGE, B.A.Sc., 320 Concord Ave., Toronto, Ont.  
*Manager, Excelsior Electric Mfg. Co., Ltd.*
1. A. U. SANDERSON, B.A.Sc., Toronto, Ont.  
*Chief Engineer, Filtration Plant.*

\*Diploma with honours.

Pigott - Healy Const. Co.

## 1909—Continued.

3.*R. A. SARA, B.A.Sc., E.E., <i>American Cellulose &amp; Chemical Mfg. Co.</i>	New York, N.Y.
3.*C. SCHWENGER, B.A.Sc., <i>Distribution Eng., Toronto Hydro-Electric System.</i>	226 Yonge St., Toronto, Ont.
1. C. A. SCOTT,	42½ Harvard Ave., Toronto, Ont.
1. A. SEDGWICK, <i>Ontario Dept. of Public Works.</i>	Toronto, Ont.
1. B. H. SEGRE, B.A.Sc.,	Jamaica, B.W.I.
1. F. V. SEIBERT, B.A.Sc., <i>Engineer and Surveyor, Dept. of Interior.</i>	Edmonton, Alta.
5. M. R. SHAW, B.A.Sc., <i>Chief Chemist, Export Oil Corporation.</i>	Waggaman, La.
3. M. W. SPARLING, B.A.Sc., <i>Electric Power Co.</i>	Cobourg, Ont.
3. J. J. SPENCE, <i>With Sovereign Construction Co., Ltd.</i>	Toronto, Ont.
1. D. S. STAYNER, B.A.Sc., C.E.,	201 Heath St. W., Toronto, Ont.
2.*R. B. STEWART, M.A., B.A.Sc.	Toronto, Ont.
1.*N. C. STEWART, B.A.Sc.,	Nelson, B.C.
1.*P. H. STOCK,	Toronto, Ont.
1. J. C. STREET, B.A.Sc., <i>Welland Ship Canal.</i>	St. Catharines, Ont.
3. S. STROUD, B.A.Sc.,	Hamilton, Ont.
1. C. C. SUTHERLAND, B.A.Sc., C.E., <i>Alberta Dept. of Public Works.</i>	10714 125th St., Edmonton, Alta.
1. R. G. SWAN, B.A.Sc., <i>Chief of Hydrographic Survey for B.C.</i>	Vancouver, B.C.
1. A. D. SWORD, B.A.Sc., <i>With Canadian Milk Products.</i>	Woodstock, Ont.
1.*H. W. TATE, <i>c/o C. E. Goad Co.</i>	40 Belmont Park, Montreal, Que.
3.*E. A. THOMPSON, <i>Standard Steel Construction Co.</i>	Welland, Ont.
1. G. A. TIPPER, B.A.Sc., <i>Contracting Surveyor.</i>	Brantford, Ont.
3. A. G. TREES, B.A.Sc., <i>S. Trees &amp; Co., Ltd.</i>	42 Wellington St. E., Toronto, Ont.
3. W. G. TURNBULL, B.A.Sc., <i>Chief Engineer, Turnbull Elevator Mfg. Co.</i>	126 John St., Toronto, Ont.
1. J. E. UNDERWOOD, <i>Dept. of Civil Engineering, University of Saskatchewan.</i>	Saskatoon, Sask.
1. C. P. VAN NORMAN, B.A.Sc., <i>Toronto and York Radial Ry.</i>	Toronto, Ont.
1. J. VAN NOSTRAND,	91 Delaware Ave., Toronto, Ont.
1. A. VATCHER, B.A.Sc., <i>With the Reid Newfoundland Co.</i>	Freshwater, Bay de Verde, Nfld.
1. C. M. WALKER, B.A.Sc., <i>Dom. Land Surveyor.</i>	Banff, Alta.
1. C. E. WEBB, B.A.Sc., <i>B.C. Hydrographic Survey, Dom. Water Power Br.</i>	Vancouver, B.C.
1. E. E. WEBB, <i>Contractor.</i>	Box 358, Orillia, Ont.
3. F. C. WHITE, B.A.Sc. <i>Engineer, Canadian Des Moines Steel Co., Ltd.</i>	164 Richmond Street, Chatham, Ont.

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 141

1909—Continued

3. A. R. WHITELAW, B.A.Sc.,	10720 103rd St., Edmonton, Alta.
1. R. G. WILKINSON, <i>Roadways Dept., City Hall.</i>	Toronto, Ont.
5.*J. A. McK. WILLIAMS, B.A.Sc., <i>A. E. Ames &amp; Co.</i>	Toronto, Ont.
1. O. T. G. WILLIAMSON, B.A.Sc.,	150 Westminster Ave., Toronto, Ont.
3. L. R. WILSON, B.A.Sc., <i>Dominion Bridge Co.</i>	Montreal, Que.
3. F. F. WILSON, B.A.Sc., <i>Surveyor.</i>	Toronto, Ont.
2. S. A. WOKEY, B.A.Sc., <i>Manager, McIntyre Mine.</i>	Schumacher, Ont.

1910.

2. J. H. ADAMS, B.A.Sc.,	25 Maynard Ave., Toronto, Ont.
3.*O. F. ADAMS, B.A.Sc.,	132 Ulster Street, Toronto, Ont.
3. J. N. AGNEW,	
1.*W. G. AMSDEN, B.A.Sc., (killed in action, Aug. 1918).	
1. J. A. BAIRD, B.A.Sc., <i>Town Engineer.</i>	Sarnia, Ont.
1.*W. J. BAIRD, B.A.Sc., <i>R. R. Grant &amp; Co., Engineers and Surveyors.</i>	730 Danforth Ave., Toronto, Ont.
1. H. A. BARNETT, B.A.Sc., <i>With G.T. Ry.</i>	Durand, Mich.
1.*E. W. BERRY,	Seaforth, Ont.
1. H. C. BINGHAM, D.L.S., <i>Engineer and Surveyor.</i>	Briercrest, Sask.
2. D. G. BISSET, B.A.Sc., <i>C.P.R. Coal Mines.</i>	Hosmer, B.C.
1.*R. H. H. BLACKWELL, B.A.Sc., <i>With Wheelock &amp; Christie.</i>	Orangeville, Ont.
1.*E. P. BOWMAN, B.A.Sc.,	West Montrose, Ont.
2. A. F. BROCK, B.A.Sc., <i>Chief Mine Surveyor, Canadian Copper Co.</i>	Copper Cliff, Ont.
3. M. O. BROWNE,	313 McClellan Ave., Detroit, Mich.
3. J. R. BURGESS, B.A.Sc.,	Kingston, Ont.
1. N. G. H. BURNHAM, B.A.Sc. (deceased).	
3.*W. C. CALE, B.A.Sc., <i>Laboratory Eng., Hydro-Electric Power Commission.</i>	8 Strachan Ave., Toronto, Ont.
2.*A. D. CAMPBELL, B.A.Sc., M.E., <i>Mining Engineer, O'Brien Mine.</i>	Cobalt, Ont.
3. W. M. CARLYLE, B.A.Sc. (killed in action, 1916).	
3. N. S. CAUDWELL,	82 Colborne Street, Brantford, Ont.
3. A. W. CHESNUT, B.A.Sc., (Died at Shorncliffe, England, while on Overseas Service).	
1. D. C. CHISHOLM, B.A.Sc., <i>Resident Engineer, C.N.R.</i>	Winnipeg, Man.
1. H. S. CLARK,	St. Catharines, Ont.
1. J. A. CLAVEAU,	Chicoutimi, Que.
3. L. S. COCKBURN, B.A.Sc., <i>Mechanical Engineering Dept., Smith, Hinchman &amp; Grylls.</i>	Detroit, Mich.
3. A. G. CODE, B.A.Sc.,	Box 404, Niagara Falls S., Ont.

\*Diploma with honours.

## 1910—Continued.

3. C. R. COLE, B.A.Sc.,	Woodstock, Ont.
1. G. A. COLQUHOUN, B.A.Sc., <i>Department of the Interior.</i>	Ottawa, Ont.
4.*J. H. CRAIG, B.A.Sc.,	43 Cuthbert Crescent, Toronto, Ont.
3.*C. D. DEAN, B.A.Sc., <i>With Imperial Oil Co.</i>	31 Hewitt Ave., Toronto, Ont.
5. A. V. DELAPORTE, B.A.Sc., <i>Chemist, Provincial Board of Health Laboratory.</i>	Toronto, Ont.
3. R. L. DOBBIN, B.A.Sc., <i>Superintendent City Waterworks Dept.</i>	Peterboro', Ont.
3.*W. P. DOBSON, M.A.Sc., <i>Laboratory Eng., Hydro-Electric Power Commission.</i>	8 Strachan Ave., Toronto, Ont.
3.*J. M. DUNCAN, B.A.Sc.,	Toronto, Ont.
1. L. F. EADIE,	90 Laughton Ave., Toronto, Ont.
2. V. H. EMERY, B.A.Sc., <i>Mine Supt., Hollinger Mines.</i>	Timmins, Ont.
3. W. J. EVANS, B.A.Sc., <i>With Hydro-Electric Power Comm.</i>	Toronto, Ont.
3. H. W. FAIRLIE, <i>Ry. Dept., The Northern Elec. &amp; Mfg. Co.</i>	Montreal, Que.
3.*C. R. FERGUSON, B.A.Sc.,	Toronto, Ont.
3. J. W. FERGUSON, B.A.Sc., <i>Dominion Bridge Co.</i>	Toronto, Ont.
4.*J. B. K. FISKEN, B.A.Sc., <i>With Darling &amp; Pearson.</i>	Toronto, Ont.
1. A. W. FLETCHER, B.A.Sc.,	Thornton, Ont.
1.*J. A. FLETCHER, <i>Assistant to D. W. Robinson, D.L.S.</i>	Fisher River, Man.
3. F. T. FLETCHER, B.A.Sc. <i>Dept. of Public Works.</i>	Calgary, Alta.
3. T. R. C. FLINT, B.A.Sc., <i>With Hydro-Electric Power Commission.</i>	12 Galley Ave., Toronto, Ont.
3. R. C. FOLLETT (deceased).	
2. J. M. FOREMAN, B.A.Sc.	Toronto, Ont.
1. W. J. FOSTER.	
3.*W. C. FOULDS, B.A.Sc., <i>Imperial Munitions Board.</i>	306 Royal Bank Bldg., Toronto, Ont.
1. A. FRASER, B.A.Sc. (deceased)	
2. J. FREDIN, <i>c/o B.C. Copper Co.</i>	Princeton, B.C.
3. H. GALL, B.A.Sc., <i>Factory Supt., Robertson Bros. Ltd.</i>	103 Queen St. E., Toronto, Ont.
1. M. M. GIBSON, B.A.Sc., <i>Gibson &amp; Gibson, O.L.S., C.E.</i>	Toronto, Ont.
1. J. M. GIBSON, B.A.Sc., <i>With B. H. Prack.</i>	1A Havelock St., Toronto, Ont.
1. V. A. E. GOAD, B.A.Sc., <i>Chas. E. Goad Engineering Co., Ltd.</i>	Montreal, P.Q.
3. V. S. GOODEVE,	Phoenix, B.C.
1. H. GOODRIDGE,	Edmonton, Alta.
2. W. A. GORDON,	Wallaceburg, Ont.
3. V. F. GOURLAY, B.A.Sc., <i>Manufacturer.</i>	Galt, Ont.

\*Diploma with honours.

## 1910—Continued.

3. E. B. GRAHAM, B.A.Sc., Pittsburgh, Pa.  
 2. R. L. GREENE, B.A.Sc., 42 Crescent Road, Toronto, Ont.  
 5. J. H. HARRIS, B.A.Sc., Danforth Ave., Toronto, Ont.  
*W. Harris & Co.*
1. N. J. HARVIE, B.A.Sc. (Killed in action, France, 1916).  
 1. J. G. HELLIWELL (Killed in action, France, 1915).  
 1. J. F. HENDERSON,  
 3. F. G. HICKLING, B.A.Sc., East Pittsburgh, Pa.  
*Westinghouse Electric & Manufacturing Co.*  
 1. E. F. HINCH, 127 Delaware Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1. O. H. HOOVER, B.A.Sc., Calgary, Alta.  
*Immigration Office.*  
 2. P. E. HOPKINS, B.A.Sc., Toronto, Ont.  
*With Ontario Bureau of Mines.*  
 3.\*W. J. IRWIN,  
 2. F. L. JAMES, B.A.Sc., Tillsonburg, Ont.  
 3. E. A. JAMIESON, Vancouver, B.C.  
*MacAndrew & Jamieson Eng. Co.*  
 1. C. C. JEFFERY, Toronto, Ont.  
*Asst. Eng., Public Works Dept.*  
 1. H. C. JOHNSTON, 509 Palmerston Ave., Toronto, Ont.  
 1. R. H. JOHNSTON, B.A.Sc., 10162 116th St., Edmonton, Alta.  
 1. J. C. KEITH, B.A.Sc., Moose Jaw, Sask.  
*City Engineer's Office.*  
 2.\*J. T. KING, B.A.Sc., Toronto, Ont.  
*Lecturer in Mining Engineering, University of Toronto.*  
 3. G. A. KINGSTONE, B.A.Sc., 79 Oriole Road, Toronto, Ont.  
 2. G. L. KIRWAN, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys Br., Dept. of Interior.*  
 5. P. T. KIRWAN, B.A.Sc., Box 918, Crockett, California  
 1. S. KNIGHT, B.A.Sc., Bruce Mines, Ont.  
 3. E. R. LAWLER, 190 University Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 3.\*C. B. LEAVER, B.A.Sc., Dartmouth, N.S.  
*Asst. Superintendent, Imperial Oil Co.*  
 3. R. G. LEE, B.A.Sc., 226 Yonge Street, Toronto, Ont.  
*Toronto Hydro-Electric System.*  
 1. J. N. LEITCH (deceased).  
 1. J. C. LONGSTAFF, New Toronto, Ont.  
 3. J. B. MACDONALD, B.A.Sc., Victoria, B.C.  
*With Cameron Lumber Co., Ltd.*  
 2. A. D. MACDONALD, B.A.Sc., Cobalt, Ont.  
 1. J. A. MACDONALD, B.A.Sc., Ridgetown, Ont.  
*Private Practice.*  
 1. G. A. MACDONALD, B.A.Sc., Vancouver, B.C.  
*Private Practice.*  
 1. A. E. MACGREGOR, B.A.Sc., Simcoe, Ont.  
 1. E. G. MACKAY, B.A.Sc., 606 Bank of Hamilton Chambers, Hamilton, Ont.  
 1. G. G. MACLENNAN, B.A.Sc. (Killed in action, France, 1917).  
 1. D. D. MACLEOD, B.A.Sc. (Died of wounds received in action, France, 1916).

## 1910—Continued.

3. H. G. MACMURCHY, B.A.Sc., 2400 Oliver Bldg., Pittsburg, Pa.  
*Engineering Dept., Aluminum Co. of America.*
- 3.\*H. J. MACTAVISH, B.A.Sc.,  
*Toronto Hydro-Electric System.* Toronto, Ont.
4. T. C. McBRIDE, B.A.Sc., Calgary, Alta.
1. S. G. McDougall, B.A.Sc., 47 Vittoria Street, Ottawa, Ont.
- 1.\*T. A. McELHANNEY, B.A.Sc., Ottawa, Ont.  
*Special Surveys Br.*
- 1.\*P. J. McGARRY, D. & O.L.S., Toronto, Ont.
- 3.\*L. R. McKIM, Brantford, Ont.
- 1.\*J. McNIVEN, B.A.Sc., 20 Sussex St., Toronto, Ont.
3. J. I. MCSLOY, B.A.Sc., St. Catharines, Ont.
2. A. W. R. MAISONVILLE, B.A.Sc., ~ Montreal, Que.  
*Dominion Bridge Co.*
- 1.\*N. MARR, B.A.Sc., Campbellford, Ont.  
*Res. Engr., Trent Canal.*
- 1.\*W. H. MARTIN, B.A.Sc., Toronto, Ont.  
*Wm. F. Sparling Co., Arch. and Engs.*
2. A. C. MATTHEWS, B.A.Sc., 89 St. George St., Toronto, Ont.
1. C. H. MEADER, B.A.Sc., O.L.S., Toronto, Ont.
- 3.\*H. O. MERRIMAN, B.A.Sc., London, England  
*Research work.*
- 1.\*D. J. MILLER, 45 Penetang St., Orillia, Ont.
1. F. S. MILLIGAN, B.A.Sc., 33 Rathnally Ave., Toronto, Ont.
3. P. E. MILLS, B.A.Sc., 320 W. 56th St., New York, N.Y.
3. J. P. MORGAN, Toronto, Ont.  
*With Orpen Construction Co.*
1. F. R. MORTIMER, B.A.Sc., Ottawa, Ont.  
*Hydrographic Survey, Dept. of Naval Service.*
1. A. H. MUNRO, B.A.Sc., 352 Brock St., Peterborough, Ont.
3. J. C. NASH, B.A.Sc., 135 Elmwood Ave., London, Ont.
- 1.\*V. A. NEWHALL, B.A.Sc., Edmonton, Alta.  
*Dept. of Interior.*
- 2.\*W. E. NEWTON, B.A.Sc., Sandon, B.C.  
*Slocan Star Mines.*
1. F. T. NICHOL, B.A.Sc., 306 Continental Life Bldg., Toronto, Ont.  
*Supt. Eng., Archibald & Holmes.*
1. C. M. O'NEIL, B.A.Sc., Ottawa, Ont.  
*Top. Surveys Branch, Dept. of Interior.*
3. C. E. PALMER, B.A.Sc., E.E., Toronto, Ont.  
*Bell Telephone Co.*
3. G. C. PARKER, M.A.Sc., C.E., Parliament Bldgs., Toronto, Ont.  
*Ontario Dept. of Public Highways.*
3. K. K. PEARCE, B.A.Sc., Lachine, Que.  
*Dominion Bridge Co.*
1. A. W. PEARSON, Weston, Ont.
3. C. H. PHILLIPS, B.A.Sc., 85 Manchester Place, Buffalo, N.Y.
1. D. E. PYE, Cranbrook, B.C.
1. W. S. RAMSAY, B.A.Sc., 86 Robert St., Toronto, Ont.
3. B. J. REDFERN (deceased).
3. C. E. RICHARDSON, B.A.Sc., Toronto, Ont.
1. H. C. RITCHIE, Calgary, Alta.  
*Dept. of Public Works.*
1. O. W. ROSS, B.A.Sc., Burlington, Ont.

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 145

1910—Continued.

1. W. F. B. RUBIDGE,  
*Abitibi Power & Paper Co., Ltd.* Matheson, Ont.
3. W. C. SHAW, B.A.Sc.,  
*A. L. Torgis Garage.* Toronto, Ont.
3. N.C. SHERMAN,
- 1.\*W. C. SMITH, B.A.Sc., C.E.,  
*Engineer, Water Rights Branch, Dept. of Lands.* Victoria, B.C.
2. F. L. SMITH, Burlington, Ont.
5. G. E. SMITH, B.A.Sc.,  
*Standard Chemical Co.* Longford, Ont.
2. R. J. SPRY, B.A.Sc., Eustis Mine, Que.
2. A. L. STEELE, B.A.Sc., Fergus, Ont.
- 2.\*H. M. STEVEN, B.A.Sc., 83 St. Clair Ave. West, Toronto, Ont.
- 1.\*L. I. STONE,  
*Resident Engineer, G.T. Ry.* Toronto, Ont.
3. A. L. SUTHERLAND, B.A.Sc.,  
*With Canadian General Electric Co.* Peterborough, Ont.
3. E. A. TERNAN, B.A.Sc.,  
*Automobile Accessories.* Leamington, Ont.
- 5.\*W. H. THOM,  
*Factory Manager, Lyman Bros. & Co.* Toronto, Ont.
3. H. B. THOMPSON, B.A.Sc.,  
*Engineering Dept., Imperial Oil Co.* Sarnia, Ont.
3. R. M. A. THOMPSON, B.A.Sc.,  
*Hydro-Electric Power Commission.* Toronto, Ont.
- 2.\*C. G. TITUS,  
*Renfrew Molybdenum Co.* Renfrew, Ont.
3. K. M. VAN ALLEN, B.A.Sc. (Died of wounds in German prison camp, 1916).
1. L. T. VENNEY, B.A.Sc.,  
*With Morris Knowles, Sanitary Engineer.* Windsor, Ont.
1. N. WAGNER, 19 Gerrard St. E., Toronto, Ont.  
*Bridge Dept., Canada Foundry Co.*
1. R. M. WALKER, B.A.Sc., Box 86, Hawkesbury, Ont.
2. T. WALTON, B.A.Sc. (deceased).
1. G. A. WARRINGTON, B.A.Sc.,  
*M.L.S., Parliament Bldgs.* Winnipeg, Man.
3. M. B. WATSON, B.A.Sc., M.E., C.E.,  
*Director of Engineering, Toronto Technical Schools.* Toronto, Ont.
- 3.\*H. M. WHITE,  
*With Dominion Bridge Co.* Lachine Locks, Que.
1. J. L. WHITSIDE, B.A.Sc., (died of wounds received in action, 1916).
4. W. S. WICKENS, B.A.Sc.,  
*E. A. James Co. Ltd.* Toronto, Ont.
- 3.\*G. K. WILLIAMS, B.A.Sc. (Killed in collision at Luxeuil, while on active service, 1916).
- 1.\*W. H. WILSON, B.A.Sc.,  
*Estimator, McGregor & McIntyre, Ltd.* Toronto, Ont.
3. G. E. WOODLEY (deceased).
1. G. R. WORKMAN,  
*Demonstrator in Drawing, University of Toronto.* Toronto, Ont.

\*Diploma with honours.

## 1910—Continued.

3. L. A. WRIGHT, B.A.Sc., 278 Jarvis St., Toronto, Ont.  
*Asst. Engineer, C.P.R.*  
3.\*A. W. YOUELL, B.A.Sc. (died of wounds received in France, 1918.)  
1. W. S. YOUNG, B.A.Sc., Guelph, Ont.

## 1911.

- 5.\*J. AITKEN, B.A.Sc., Toronto, Ont.  
1. L. B. ALLAN, B.A.Sc., *Dept. of Public Works, City Hall.*  
3. E. G. ARCHER, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*  
1. L. A. BADGLEY, B.A.Sc., Toronto, Ont.  
*Architectural Dept., City Hall.*  
1. T. H. BARTLEY, B.A.Sc., O.L.S., Toronto, Ont.  
2.\*H. L. BATTEN, Glencoe Lodge, Vancouver, B.C.  
*Mining Engineer.*  
1. G. L. BERKELEY, 320 Roncesvalles Ave., Toronto, Ont.  
*Toronto Harbour Commissioners.*  
3.\*J. H. BILLINGS, B.A.Sc., S.M., Philadelphia, Pa.  
*Professor of Mechanical Engineering, Drexel Institute.*  
2.\*J. R. BISSETT, B.A.Sc., Ottawa, Ont.  
*Water Power Branch, Dept. of Interior.*  
3. W. O. BOSWELL, B.A.Sc. (Died of pleuro-pneumonia while on active service, 1919).  
1. F. BOWMAN, Lachine, Que.  
*Dominion Bridge Co.*  
3. T. W. BRACKINREID, B.A.Sc., Winnipeg, Man.  
*Canadian General Electric Co.*  
2. W. M. BROCK, B.A.Sc., Thamesford, Ont.  
1. W. H. D. BROUSE, B.A.Sc., Toronto, Ont.  
*With Gordon C. Edwards.*  
3. H. O. BROWN, B.A.Sc., Toronto, Ont.  
*E. A. James & Co.*  
3.\*E. T. CAIN, B.A.Sc., Moncton, N.B.  
*Canadian Government Railways.*  
1. C. S. CAMERON, Regina, Sask.  
1. C. D. CAMPBELL, Hamilton, Ont.  
*Manager, Hamilton Securities, Ltd.*  
6.\*W. W. CHADWICK, B.A.Sc., Hamilton, Ont.  
*Manager, Canadian Chadwick Metal Co., Ltd.*  
1. R. B. CHANDLER, B.A.Sc., Whalen Building, Port Arthur, Ont.  
1. P. G. CHERRY, B.A.Sc., Toronto, Ont.  
*Secretary and Sales Manager, Might Directories, Ltd.*  
3. E. F. CHESNUT, B.A.Sc., Toronto, Ont.  
*Instructor, Invalided Soldiers' Commission.*  
1. H. J. CLARK, B.A.Sc., Toronto, Ont.  
*Dept. of Public Highways.*  
1. F. W. CLARK, 190 University Ave., Toronto, Ont.  
*Field Eng., Hydro-Electric Power Commission.*  
3. F. S. CLEARY (deceased).  
2.\*D. B. COLE, B.A.Sc., Cleveland, Ohio  
*Cleveland Cadillac Co.*  
3.\*A. S. COOK, B.A.Sc., Cleveland, Ohio  
*Superintendent, Construction Dept., Geo. R. Cook Co.*

FACULTY OF APPLIED SCIENCE AND ENGINEERING 147

**1911—Continued.**

- |  |                                      |
|--|--------------------------------------|
| 1. C. W. CORNELL,<br><i>Highways Dept., Parliament Bldgs.</i>                                | Toronto, Ont.                        |
| 1. M. E. CROUCH,   | 14 Algoma St., Port Arthur, Ont.     |
| 3. W. M. CRUTHERS, B.A.Sc.,<br><i>Can. Gen. Electric Co.</i>                                 | Peterboro', Ont.                     |
| 1. O. F. CUMMINS,<br><i>Provincial Drainage Engineer</i>                                     | Regina, Sask.                        |
| 3. T. J. CUNERTY,<br><i>With Westinghouse Electric &amp; Mfg. Co.</i>                        | 165 Broadway, New York, N.Y.         |
| 1. C. H. CUNNINGHAM, B.A.Sc.,  | Hamilton, Ont.                       |
| 1. J. H. CURZON,<br><i>Instructor, Invalided Soldiers' Commission.</i>                       | 178 Kingston Rd., Toronto, Ont.      |
| 3.*F. K. D'ALTON, B.A.Sc.,<br><i>Asst. Laboratory Eng., Hydro-Electric Power Commission.</i> | 8 Strachan Ave., Toronto, Ont.       |
| 1. W. B. DAVIS, B.A.Sc.,<br><i>Trent Valley Canal.</i>                                       | Frankford, Ont.                      |
| 3. F. C. DEGUERRE, B.A.Sc. (deceased).   |                                      |
| 5. L. W. DONCASTER,<br><i>With Auli &amp; Wiborg Co.</i>                                     | Toronto, Ont.                        |
| 3.*F. H. DOWNING,  | Lucan, Ont.                          |
| 1. W. B. DUNBAR, B.A.Sc.,<br><i>Demonstrator in Drawing, University of Toronto.</i>          | Toronto, Ont.                        |
| 5. C. H. ECKERT, B.A.Sc.,  | 434 Queen's Ave., London, Ont.       |
| 3. J. A. ELLIOT, B.A.Sc.,<br><i>Castner Electrolytic Alkali Co.</i>                          | Niagara Falls, N.Y.                  |
| 1. G. R. ELLIOTT, B.A.Sc.,<br><i>Mine Engineer, Canmore Coal Co.</i>                         | Canmore, Alta.                       |
| 1. C. F. ELLIOTT, B.A.Sc.,<br><i>c/o Elliott Bros.</i>                                       | 229 Yonge St., Toronto, Ont.         |
| 1. K. A. FARRELL, B.A.Sc.,   | 104 N. 13th St., Allentown, Pa.      |
| 3. T. J. FARRELLY,   | Alma, Ont.                           |
| 1. S. E. FLOOR, B.A.Sc.,<br><i>O. L. Surveyor and Civil Engineer.</i>                        | Port Arthur, Ont.                    |
| 3. C. C. FLYNN,  | London, Ont.                         |
| 5. E. L. FRANKEL, B.A.Sc.,<br><i>Frankel Bros.</i>   | Toronto, Ont.                        |
| 2. E. E. FREELAND, B.A.Sc.,  | 638 Church St., Toronto, Ont.        |
| 1. J. R. FREEMAN, B.A.Sc.,   | Brighton, Ont.                       |
| 4.*H. P. FRID, B.A.Sc.,<br><i>Frid Construction Co.</i>                                      | Toronto, Ont.                        |
| 3.*R. J. FULLER, B.A.Sc.,<br><i>Chief Engineer, John V. Gray Const. Co., Ltd.</i>            | Toronto, Ont.                        |
| 5.*J. L. GOODERHAM, B.A.Sc.,<br><i>General Distilling Co.</i>                                | Toronto, Ont.                        |
| 3. R. E. GREEN, B.A.Sc.,   | Kenaston, Sask.                      |
| 3. E. A. GREENE, B.A.Sc.,<br><i>Lumsden &amp; Greene.</i>                                    | 139 Cottingham St., Toronto, Ont.    |
| 3. H. G. HALL,<br><i>With Hydro-Electric System.</i>   | Ingersoll, Ont.                      |
| 1. G. M. HAMILTON, B.A.Sc.,  | New Hamburg, Ont.                    |
| 2. H. E. HARCOURT,<br><i>Mgr., Benedict Proctor Mfg. Co.</i>                                 | Box 189, Trenton, Ont.               |
| 3. M. B. HASTINGS,<br><i>Secretary, A. H. Winter Joyner, Ltd.</i>                            | 100 Wellington St. W., Toronto, Ont. |

\*Diploma with honours.

## 1911—Continued.

2. M. B. HEEBNER, B.A.Sc.,  
*With The Foundation Co.* Coquitlam, B.C.
2. F. I. HELSON,  
*With C.N. Ry.* Newburgh, Ont.
3. H. R. HILL, B.A.Sc.,  
*Hydro-Electric Power Commission.* Toronto, Ont.
1. A. J. HUFF, B.A.Sc., 108 Eighth St., Edmonton, Alta.  
1. K. HUFMAN,  
Toronto, Ont.
- \*H. HYATT, B.A.Sc.,  
*With C.H. Wheeler Mfg. Co.* Philadelphia, Pa.
- \*R. H. JARVIS, B.A.Sc. (Accidentally killed while on overseas service, 1918).  
1.\*L. E. JONES,  
*Highways Dept., Parliament Buildings.* Toronto, Ont.
- \*E. A. KELLY,  
*Construction Dept., C.P.R.* Winnipeg, Man.
- \*M. KIRKWOOD, B.A.Sc.,  
*Am. Telephone and Telegraph Co.* New York, N.Y.
- \*J. LANNING, B.A.Sc., O.L.S.
- N. LAWLESS, (died of pneumonia, France, 1915).
- W. R. LETHBRIDGE.
- M. I. LIEBERMAN, B.A.Sc., 700 Queen Street W., Toronto, Ont.
- G. L. LILLIE, B.A.Sc.,  
*Toronto Hydro-Electric System.* Toronto, Ont.
- A. L. LONG, B.A.Sc.,  
*Long Chemical Co.* Toronto, Ont.
- \*A. W. P. LOWRIE, B.A.Sc.,  
*Dept. of Interior Reclamation Service.* Calgary, Alta.
- W. M. MACANDREW, B.A.Sc.,  
*MacAndrew & Jamieson Eng. Co.* Vancouver, B.C.
- \*R. V. MACAULAY, B.A.Sc.,  
Toronto, Ont.
- \*J. T. MACBAIN,  
*Union Carbide Co.* Niagara Falls, N.Y.
- \*R. E. A. MACBETH, B.A.Sc. (Accidentally killed while on overseas service, 1918).
- F. M. MACDONALD, B.A.Sc. 3 Rusholme Rd., Toronto, Ont.
- \*W. S. MACKENZIE,  
*With Canadian Linderman Co., Ltd.* Woodstock, Ont.
- J. A. MACKINNON, B.A.Sc.,  
Calgary, Alta.
- \*J. G. MACLAURIN, B.A.Sc., Box 621, Sault Ste. Marie, Ont.
- J. B. MCANDREW, B.A.Sc., 70 Church St., St. Catharines, Ont.
- \*J. A. MCEACHREN,  
Strathburn, Ont.
- R. W. McELROY, B.A.Sc.,  
Toronto, Ont.
- H. J. MCEWEN, B.A.Sc.  
Brantford, Ont.
- \*W. G. McGHIE, B.A.Sc.,  
*Sales Eng., Canadian Crocker-Wheeler Co., Ltd.* St. Catharines, Ont.
- D. A. MCKENZIE, B.A.Sc.,  
*With Hydro-Electric Power Commission.* Toronto, Ont.
- A. J. McLAREN, B.A.Sc., 463 Lisgar St., Ottawa, Ont.
- A. G. MCLEISH,  
*Private Practice.* 579 Keele St., Toronto, Ont.
- \*R. A. MCLELLAN, B.A.Sc.,  
*With Murphy & Underwood.* Saskatoon, Sask.

\*Diploma with honours.

## 1911—Continued.

2. W. B. MCPHERSON, B.A.Sc., 6 King St. W., Toronto, Ont.  
*Barrister-at-law.*
3. A. A. MCQUEEN, B.A.Sc.,
- 4.\*H. H. MADILL, B.A.Sc., Registered Architect, Toronto, Ont.  
*Lecturer in Architecture, University of Toronto.*
3. J. C. MARTIN, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
3. C. A. MEADOWS, B.A.Sc., 6 Sussex Ave., Toronto, Ont.  
*Geo. B. Meadows Co.*
1. L. G. MILLS, B.A.Sc., 89 Glen Road, Toronto, Ont.
5. L. C. MITCHELL, Winnipeg, Man.
2. J. A. MORPHY, B.A.Sc., Oshawa, Ont.
1. M. H. MURPHY, B.A.Sc., Toronto, Ont.  
*Contractor.*
1. J. C. MURTON, 102 Tyndall Ave., Toronto, Ont.  
*With Victoria Turbine Mixer Co., Ltd.*
3. E. H. NIEBEL, B.A.Sc., Regina, Sask.  
*Northern Electrical Co.*
3. C. K. NIXON, B.A.Sc., Detroit, Mich.
3. E. S. NOBLE, B.A.Sc., Timmins, Ont.  
*Northern Canadian Power Co.*
1. R. K. NORTHEY, B.A.Sc.,
2. W. A. O'FLYNN, B.A.Sc., Cobalt, Ont.  
*Temiskaming Mine.*
1. W. V. OKE, B.A.Sc., 265 Delaware Ave., Toronto, Ont.
2. J. A. ORR, B.A.Sc., Creighton Mine, Ont.  
*Surveyor, International Nickel Co.*
3. J. S. PARKER, B.A.Sc., Toronto, Ont.  
*Municipal Eng., Hydro-Electric Power Commission.*
- 3.\*J. H. PARKIN, B.A.Sc., M.E., Toronto, Ont.  
*Lecturer in Mechanical Engineering, University of Toronto.*
- 1.\*J. McD. PATTON, B.A.Sc., Toronto, Ont.
3. C. L. PEARSON, Calgary, Alta.  
*With City of Calgary.*
2. S. J. PEPLER. (Killed in action, France, 1917).
- 3.\*W. J. PERRIN, B.A.Sc. (deceased).
1. B. W. PICK, B.A.Sc., Regina, Sask.  
*With Smith & Phillips.*
- 3.\*E. H. PORTE, Renfrew, Ont.
- 1.\*F. M. PRATT, B.A.Sc., 343 Nepean Street, Ottawa, Ont.
4. H. PULLAN, Toronto, Ont.  
*With E. Pullan.*
1. L. J. QUINLAN, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*
1. L. W. RAILTON, Newport, Eng.
- 1.\*J. E. RATZ, B.A.Sc., D.T.S., Ottawa, Ont.  
*Geodetic Survey, Dept. of the Interior.*
1. F. N. READ, B.A.Sc. (Killed in action, Passchendaele, 1917).
4. E. V. REID (Killed in action, France, 1917)
- 1.\*W. A. RICHARDSON, B.A.Sc., 1135 Catherine St., Victoria, B.C.
- 1.\*W. E. ROBINSON, B.A.Sc., c/o Perfection Lodge, Calgary, Alta.
1. H. L. ROBLIN, B.A.Sc., 406 Tegler Bldg., Edmonton, Alta.  
*Canadian National Railway.*

## 1911—Continued.

3. L. W. ROTHERY, B.A.Sc., <i>Westinghouse Machine Co.</i>	East Pittsburg, Pa.
4.*T. L. F. ROWE, <i>Manager, Ford Garage.</i>	Whitby, Ont.
3. A. S. RUNCIMAN, <i>Marconi Wireless Telegraph Co.</i>	Montreal, Que.
3. F. G. RUTLEY, B.A.Sc., <i>Foundation Co. of Montreal.</i>	Sydney, N.S.
1. E. M. SALTER,	901 Boyd Bldg., Winnipeg, Man.
1. F. R. SCANDRETT, B.A.Sc.,	Belgrave, Ont.
5. MISS H. E. SCOTT, B.A.Sc.	Forest, Ont.
5.*J. W. SCOTT, B.A.Sc., <i>Chief Chemist, Research Dept., T. Eaton Co.</i>	Toronto, Ont.
3. N. D. SEATON, B.A.Sc., <i>With General Electric Co.</i>	360 Stewart St., Peterboro, Ont.
1. N. SHARPE, <i>Greater Winnipeg Water District.</i>	501 Tribune Bldg., Winnipeg, Man.
4.*P. SHEARD, B.A.Sc.,	314 Jarvis Street, Toronto, Ont.
1.*W. A. SIBBETT, D. & O.L.S., <i>With Columbian Government.</i>	Barranquilla, Columbia, S.A.
2.*C. P. SILLS, B.A.Sc.,	Seaforth, Ont.
1.*K. H. SMITH, <i>Water Power Branch, Dept. of the Interior.</i>	Ottawa, Ont.
3. M. L. SMITH, B.A.Sc. (deceased).	
1. R. G. SNEATH, <i>With Hydro-Electric Power Commission.</i>	Toronto, Ont.
3.*G. E. SQUIRE, B.A.Sc.,	Toronto, Ont.
3. W. S. STEELE, B.A.Sc. (deceased).	
5.*A. E. STEWART, B.A.Sc.,	136 Bedford Rd., Toronto, Ont.
3.*R. O. STEWART, B.A.Sc., <i>Bridge Dept., Intercolonial Ry.</i>	Moncton, N.B.
3.*R. A. STORY, B.A.Sc., <i>B.C. Telephone Co.</i>	325 13th Ave. W., Vancouver, B.C.
1. C. F. SZAMMERS, <i>Supt. Eng., Sherwood Construction Co.</i>	Sudbury, Ont.
3. R. TAYLOR, B.A.Sc., <i>Demonstrator in Electrical Engineering, University of Toronto.</i>	Toronto, Ont.
1. J. B. TEMPLE, B.A.Sc., <i>Toronto Iron Works.</i>	Toronto, Ont.
3. G. C. THOMAS, <i>With Hydro-Electric Power Commission.</i>	Toronto, Ont.
1. R. D. TORRANCE, B.A.Sc.,	Guelph, Ont.
1. W. G. TOUGH, B.A.Sc. (Died of wounds received in action, Sept. 1918).	
1.*N. VICKERS. (Died of wounds received in action, April 1917).	
2. J. H. C. WAITE, B.A.Sc., <i>Consulting Engineer.</i>	Toronto, Ont.
1. W. D. WALCOTT, B.A.Sc., C.E., <i>With Hydro-Electric Power Commission.</i>	8 Strachan Ave., Toronto, Ont.
3. G. L. WALLACE, B.A.Sc., <i>Engineer, R.C. Construction, City Arch. Dept., City Hall.</i>	Toronto, Ont.
1. A. WARDELL, B.A.Sc., <i>Toronto Iron Works.</i>	4 Williamson Road, Toronto, Ont.

\*Diploma with honours.

## 1911—Continued.

1. F. E. WATSON, B.A.Sc., Kingston, Ont.  
*Assistant Professor, Dept. Mechanical Eng., Queen's University.*
- 3.\*P. G. WELFORD, B.A.Sc., Guelph, Ont.  
*White Sewing Machine Co.*
2. A. G. WHEELER, B.A.Sc., Jackson's Point, Ont.
3. G. H. WILKES, B.A.Sc., Toronto, Ont.  
*Lecturer in Machine Design, University of Toronto.*
- 5.\*E. R. WILLIAMS, 43 Kendal Ave., Toronto, Ont.
- 3.\*H. A. WILSON, Glenora, Ont.  
*Supt., J. C. Wilson & Co., Mechanical Engineers.*
3. C. S. WOOD, Courtenay, B.C.  
*Electrical Engineer.*
1. W. G. WORDEN, B.A.Sc., Oshawa, Ont.  
*Town Engineer.*
- 1.\*W. J. T. WRIGHT, B.A.Sc., Toronto, Ont.  
*Lecturer in Drawing, University of Toronto.*
1. F. H. WRONG, B.A.Sc., D.L.S., 355 Bedford St., Sandwich, Ont.
2. W. H. WYLIE, B.A.Sc., Timmins, Ont.  
*Hollinger Mining Co.*
3. H. K. WYMAN, Toronto, Ont.  
*Eng. Dept. Can. Gen. Elec. Co.*
3. L. P. YORKE, 8526 106th St., Edmonton, Alta.
1. S. YOUNG, B.A.Sc., D. & S.L.S., Regina, Sask.  
*Public Works Dept.*
- 3.\*A. YOUNG, B.A.Sc., Toronto, Ont.  
*Instructor, Technical High School.*
1. W. E. ZINKAN, 865 24th St., Edmonton, Alta.  
*Dominion Land Surveyor.*

Owing to change of course from three to four years, there were no graduates in 1912.

## 1913.

- From this date onward "3" denotes Mechanical Engineering and "7" Electrical Engineering.
- 7.\*R. J. ALLEN, B.A.Sc., Cleveland, Ohio.  
*Rolls-Royce Co.*
- 3.\*A. S. ANDERSON, B.A.Sc., (killed in action, France, 1916)
- 1.\*C. R. AVERY, M.A.Sc., Toronto, Ont.  
*Service Officer, Vocational Branch, D.S.C.R.*
- 4.\*L. C. M. BALDWIN, B.A.Sc., Forest Hill Road, Toronto, Ont.
1. F. W. BEATTY, B.A.Sc., Pembroke, Ont.
- 1.\*W. B. BEATTY, B.A.Sc., O.L.S., Sarnia, Ont.
2. C. A. BELL, B.A.Sc., 19 Farnham Avenue, Toronto, Ont.
7. R. S. BELL, B.A.Sc., Akron, Ohio.
2. R. E. BINNS, B.A.Sc., 18 Dorville Rd., Lee, London, S.E.
- 1.\*B. S. BLACK, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. D. BLAIN, B.A.Sc., 42 Clarendon Ave., Toronto, Ont.  
*With Eby-Blain Co.*
7. E. R. BONTER, B.A.Sc., Montreal, Que.  
*Canadian Crocker-Wheeler Co.*
- 7.\*L. R. BRERETON, B.A.Sc., 6 May St., Toronto, Ont.
4. B. BROWN, B.A.Sc., 305 Manning Chambers, Toronto, Ont.  
*Architect.*

\*Degree with honours.

## 1913—Continued.

2. T. R. BUCHANAN, B.A.Sc., Thessalon, Ont.  
 7.\*W. B. BUCHANAN, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
3. B. H. A. BURROWS, B.A.Sc., (killed in action, France, 1916).  
 2. W. B. CALDWELL, B.A.Sc., Kimberley, B.C.  
*Sullivan Mine, Consolidated Mining & Smelting Co.*
1. O. L. CAMERON, B.A.Sc. (Died of wounds, France, 1918).  
 1. L. L. CAMPBELL, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
- 3.\*R. M. CARMICHAEL, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. G. M. CARRIE, B.A.Sc., 686 E. 4th Ave., Owen Sound, Ont.  
 2. H. A. CLARK, B.A.Sc., Toronto, Ont.  
 6.\*G. E. CLARKSON, B.A.Sc., Scunthorpe, England.  
*Asst. Supt. Frodingham Iron & Steel Co.*
- 3.\*B. D. CLEGG, B.A.Sc., 295 Stewart St., Peterborough, Ont.  
 7. J. H. COLEMAN, B.A.Sc., Toronto, Ont.  
*Coleman Theatre Equipment Co., 12 Queen St. E.*
- 1.\*G. M. COOK, B.A.Sc., Youngstown, Ohio.  
*Chief Estimator, Truscon Steel Co.*
1. J. A. COOMBS, B.A.Sc., Toronto, Ont.  
 4.\*B. R. COON, B.A.Sc., Toronto, Ont.  
*Canadian Aeroplanes, Ltd.*
2. W. T. CURTIS, B.A.Sc., Timmins, Ont.  
*Hollinger Mine.*
1. A. J. DATES, B.A.Sc., Detroit, Mich.  
*With Fuller Engineering Co.*
3. H. D. DAVISON, B.A.Sc., Port Weller, Ont.  
*Section 1, Welland Ship Canal.*
7. E. L. DEITCH, B.A.Sc., Welland, Ont.  
*Works Eng., Electro Metals, Ltd.*
- 2.\*R. W. DIAMOND, B.A.Sc., Anaconda, Mont.  
*Anaconda Mining Co.*
7. W. G. DUNCAN, B.A.Sc. Port Dover, Ont.
1. F. R. FIDDES, B.A.Sc., Detroit, Mich.
1. D. H. FLEMING, B.A.Sc., Owen Sound, Ont.  
*City Engineer.*
3. F. F. FOOTE, B.A.Sc., Port Dalhousie, Ont.
- 1.\*J. S. GALBRAITH, B.A.Sc., Seattle, Wash.
2. W. H. GARNHAM, B.A.Sc. (deceased).  
 1. A. M. GERMAN, B.A.Sc., Welland, Ont.
1. H. M. GOODMAN, B.A.Sc., 48 Cameron St., Toronto, Ont.
1. A. G. GRAY, B.A.Sc., 8 Dale Ave., Toronto, Ont.  
 1.\*E. R. GRAY, B.A.Sc., C.E., Hamilton, Ont.  
*City Engineer.*
3. A. J. GRAY, B.A.Sc., Toronto, Ont.  
*D.S.C.R. Artificial Limb Factory.*
7. J. P. HADCOCK, B.A.Sc., Peterboro, Ont.  
*Can. Gen. Elec. Co.*
7. H. C. HARRIS, B.A.Sc., Kingsville, Ont.
1. H. A. HAWLEY, B.A.Sc., Toronto, Ont.  
*Lewis Construction Co.*
- 1.\*R. L. HEARN, B.A.Sc., 190 University Ave., Toronto, Ont.  
*Hydro-Electric Power Com.*

\*Degree with honours.

1913—Continued.

- 1.\*H. J. HEINONEN, B.A.Sc.,  
*Columbia University.* New York, N.Y.
- 3.\*R. A. HENRY, B.A.Sc.,  
*Collingwood Shipbuilding Co.* Collingwood, Ont.
- 7.\*T. A. HILL, B.A.Sc., Ninga, Man.
- 1.\*O. HOLDEN, B.A.Sc.,  
*Hydro-Electric Power Commission.* Toronto, Ont.
1. J. T. HOWARD, B.A.Sc. (Died of wounds, France, 1918).
- 7.\*T. F. HOWLETT, B.A.Sc.,  
*Harris Abattoir Co., Ltd.* Toronto, Ont.
1. E. T. IRESON, B.A.Sc., 144 Walmer Rd., Toronto, Ont.
1. G. R. JOHNSON, B.A.Sc., Fernie, B.C.
1. R. L. JUNKIN, B.A.Sc., 165 Crescent Rd., Toronto, Ont.
- 7.\*S. S. KELLY, B.A.Sc., Lambeth, Ont.
7. A. E. KERR, B.A.Sc., Hamilton, Ont.  
*Can. Westinghouse Co.*
7. C. E. KILMER, B.A.Sc., 171 Crescent Rd., Toronto, Ont.
1. J. S. LAING, B.A.Sc., Essex, Ont.
7. A. LESLIE, B.A.Sc., 928 Second Ave. E., Owen Sound, Ont.
- 4.\*H. D. LIVINGSTON, B.A.Sc. (Killed in action, August, 1918).
- 1.\*K. F. MICKLEBOROUGH, B.A.Sc., Cornwall, Ont.  
*Dept. of Railways and Canals.*
- 7.\*G. J. MICKLER, B.A.Sc., 190 University Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. N. C. MILLMAN, B.A.Sc., 490 Huron St., Toronto, Ont.
1. F. J. MULQUEEN, B.A.Sc., Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*
- 1.\*W. C. MURDIE, M.A.Sc., D.L.S., F.R.G.S., Ottawa, Ont.  
*Geodetic Survey, Department of Interior.*
2. D. A. S. MUTCH, B.A.Sc., Thorold, Ont.  
*Supt., Coniagas Smelter.*
- 1.\*H. R. MACKENZIE, B.A.Sc., Regina, Sask.  
*Inspecting Engineer, Board of Highway Commissioners.*
1. A. R. MACPHERSON, B.A.Sc., Petrolia, Ont.
- 6.\*K. S. MACLACHLAN, B.A.Sc., Merritton, Ont.  
*Lincoln Paper Mills.*
1. W. H. MACTAVISH, B.A.Sc., Ottawa, Ont.  
*Geodetic Survey, Dept. of Interior.*
1. T. V. McCARTHY, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*With Hydro-Electric Power Comm.*
- 4.\*R. S. McCONNELL, B.A.Sc., 25 Southview Ave., Toronto, Ont.
1. W. L. McFAUL, B.A.Sc., Owen Sound, Ont.
- 2.\*K. L. NEWTON, B.A.Sc., Copper Cliff, Ont.  
*International Nickel Co., Ltd., of Canada.*
- 5.\*C. J. OTTO, B.A.Sc., Toronto, Ont.  
*Gutta Percha and Rubber Mfg. Co.,*
- 1.\*N. F. PARKINSON, M.A.Sc., 22 Vittoria St., Ottawa, Ont.  
*Deputy Minister, Dept. Soldiers' Civil Re-establishment.*
- 7.\*J. W. PEART, B.A.Sc., 61 Pearl St., St. Thomas, Ont.
- 1.\*E. PERRON, B.A.Sc., Metabetchouan, Que.
1. J. J. PHILLIPS, B.A.Sc., Transcona, Man.  
*Eng. Dept., G.T.R. Ry.*
1. H. C. QUAIL, B.A.Sc. (Killed in action, February, 1918).

\*Degree with honours.

## 1913—Continued.

7.*E. G. RATZ, B.A.Sc., <i>With Canadian Westinghouse Co.</i>	Hamilton, Ont.
1.*J. M. RIDDELL, B.A.Sc., <i>Geodetic Survey, Dept. of the Interior.</i>	Ottawa, Ont.
1.*J. E. RITCHIE, B.A.Sc., <i>With Ontario Fire Marshall.</i>	149 University Avenue, Toronto, Ont.
1.*C. S. ROBERTSON, M.A.Sc., <i>With John ver Mehr Eng. Co., Ltd.</i>	Toronto, Ont.
7.*C. C. ROUS, B.A.Sc., <i>Division General Motors.</i>	Walkerville, Ont.
7. C. H. RUSSELL, B.A.Sc., <i>Can. Westinghouse Co.</i>	Hamilton, Ont.
7.*A. A. SCARLETT, B.A.Sc.,	Mount Charles, Ont.
1.*L. SEWELL, B.A.Sc.,	Cedar Grove, Ont.
7.*M. C. SHARP, B.A.Sc.,	814 Ossington Ave., Toronto, Ont.
3.*K. E. SHAW, B.A.Sc., <i>Canadian Bridge Co.</i>	Walkerville, Ont.
3.*F. R. SIMS, B.A.Sc., <i>Dept. of Customs.</i>	Ottawa, Ont.
2.*D. G. SINCLAIR, B.A.Sc.,	145 Queen St., Sarnia, Ont.
4.*R. W. SOPER, B.A.Sc. (Killed in action, France, 1918).	
1. W. A. SPELLMAN, B.A.Sc., <i>City Engineer's Dept.</i>	Toronto, Ont.
7.*J. M. STRATHY, B.A.Sc., (killed in action, 1916).	
1. D. SUTHERLAND, B.A.Sc.,	21 Rose Ave., Toronto, Ont.
1. R. TASKER, B.A.Sc.,	57 Duke Street, Toronto, Ont.
1.*J. M. THOMPSON, B.A.Sc.	Mount Healy, Ont.
2.*W. K. THOMPSON, B.A.Sc.,	Box 218, Trail, B.C.
7.*D. J. THOMSON, B.A.Sc., <i>Staff Technical School.</i>	86 Abbott Ave., Toronto, Ont.
7. T. E. TORRANCE, B.A.Sc., <i>Bell Telephone Co.</i>	Toronto, Ont.
2. R. M. TROW, B.A.Sc., <i>Williams Trow Knitting Co., Ltd.</i>	Stratford, Ont.
1.*W. G. URE, B.A.Sc., <i>W. F. Ure &amp; Son.</i>	Woodstock, Ont.
1.*C. F. von GUNTEN, B.A.Sc.,	Blenheim, Ont.
3. R. E. WATTS, B.A.Sc. (Died of scarlet fever while on active service, 1916).	
3.*C. A. WEBSTER, B.A.Sc., <i>Sheldons, Limited.</i>	Galt, Ont.
4.*H. WEBSTER, B.A.Sc.,	306 Russell Hill Rd., Toronto, Ont.
1. D. H. WEIR, B.A.Sc., <i>Technical School.</i>	London, Ont.
1. W. S. WINTERS, B.A.Sc.,	55 Bleecker St., Toronto, Ont.
1. R. F. B. WOOD, B.A.Sc.,	116 Crescent Rd., Toronto, Ont.
7.*A. J. WRIGHT, B.A.Sc., <i>With Hydro-Electric Power Commission.</i>	190 University Ave., Toronto, Ont.
7. R. B. YOUNG, B.A.Sc., C.E., <i>Asst. Laboratory Engineer, Hydro-Electric Power Commission.</i>	8 Strachan Ave., Toronto, Ont.

\*Degree with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 155

1914

1. E. M. ABENDANA, B.A.Sc. (Died while on active service, Oct. 1918).
- 1.\*F. C. ADSETT, B.A.Sc., Guelph, Ont.
- 1.\*J. L. ALTON, B.A.Sc., Toronto, Ont.  
*Dept. of Public Works for Ontario.*
- 2.\*F. C. ANDREWS, B.A.Sc. (killed in action, France, 1915).
7. C. E. ARMER, B.A.Sc., 38 Palmerston Gardens, Toronto, Ont.  
*With Ewart & Jacob, Elec. Engrs.*
- 2.\*H. R. BANKS, B.A.Sc., 787 Markham St., Toronto, Ont.
1. E. L. BEDARD, B.A.Sc., Courtright, Ont.
- 1.\*H. J. BEDARD, B.A.Sc., Port Lambton, Ont.
1. J. T. BELCHER, B.A.Sc., Nipigon, Ont.  
*With H.E.P.C.*
1. S. G. BENNETT, B.A.Sc., Toronto, Ont.  
*Lecturer in Commercial Engineering, University of Toronto.*
1. P. V. BINNS, B.A.Sc. (Killed in action, France, 1918).
- 1.\*J. M. BLYTH, B.A.Sc., R.R. No. 3, Durham, Ont.
5. A. R. BONHAM, B.A.Sc., 47 Harbord Street, Toronto, Ont.  
*Laboratory, Provincial Board of Health.*
- 1.\*J. H. W. BOWER, B.A.Sc., Ottawa, Ont.  
*Gen. Supt., Military Hospitals Comm.*
- 3.\*H. H. BROWN, B.A.Sc., Toronto, Ont.  
*Imperial Munitions Board.*
- 7.\*W. D. BROWN, B.A.Sc., Owen Sound, Ont.
- 1.\*D. H. CAMPBELL, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*
- 3.\*H. M. CAMPBELL, B.A.Sc., St. Catharines, Ont.  
*Draftsman, Welland Ship Canal.*
- 1.\*J. J. CAMPBELL, B.A.Sc. (Died of wounds received in action, France, 1917).
- 6.\*C. N. CANDEE, B.A.Sc., 39 South Drive, Toronto, Ont.  
*Synthetic Drug Co.*
2. R. T. CARLYLE, B.A.Sc., Toronto, Ont.
2. J. M. CARTER, B.A.Sc., 125 Hilton Ave., Toronto, Ont.
2. E. V. CHAMBERS, B.A.Sc., 126 St. George St., Toronto, Ont.
- 1.\*R. M. CHRISTIE, B.A.Sc., 9847 91st Ave., Edmonton South, Alta.
3. K. M. CLIPSHAM, B.A.Sc., Toronto, Ont.  
*Clipsham & Delamere.*
7. C. E. B. CORBOULD, B.A.Sc., 115 Third St., New Westminster, B.C.
- 3.\*E. D. W. COURTICE, B.A.Sc., 107 Bay St. S., Hamilton, Ont.
1. J. W. CRASHLEY, B.A.Sc., 28 Madison Ave., Toronto, Ont.
- 7.\*A. W. CRAWFORD, B.A.Sc., Hamilton, Ont.  
*Dept. of Soldiers' Civil Re-establishment.*
- 1.\*W. CUTHBERTSON, B.A.Sc., Perth, Ont.
1. G. F. DALTON, B.A.Sc., 342 McLaren St., Ottawa, Ont.  
*Geodetic Survey, Dept. of the Interior.*
- 1.\*R. DASHWOOD, B.A.Sc., Midland, Ont.
- 1.\*R. D. DAVIDSON, B.A.Sc., Alliston, Ont.
3. R. D. DELAMERE, B.A.Sc., Guelph, Ont.  
*Dept. Soldiers' Civil Re-establishment.*
- 1.\*F. W. DOUGLAS, B.A.Sc., 276 Palmerston Ave., Toronto, Ont.
7. H. C. EDWARDS, B.A.Sc., Toronto, Ont.
- 7.\*H. F. ELLIOTT, B.A.Sc., Norwood, Ont.
1. J. A. ELLIOTT, B.A.Sc., Box 215, Nelson, B.C.

\*Degree with honours.

## 1914—Continued.

- 2.\*S. D. ELLIS, B.A.Sc. (Died after operation, while on overseas service, 1916).
- 1.\*H. E. EYRES, B.A.Sc., Peterborough, Ont.
- 1.\*O. M. FALLS, B.A.Sc.,  
*E. A. James & Co.*, Toronto, Ont.
7. D. G. FERGUSON, B.A.Sc.,  
*Hydro-Electric Power Commission.*, Toronto, Ont.
1. G. O. FLEMING, B.A.Sc., Bathurst St. & St. Clair Ave., Toronto, Ont.
2. J. S. FLEMING, B.A.Sc. (Killed in action, France, 1916).
- 1.\*J. L. FOREMAN, B.A.Sc., Collingwood, Ont.
- 7.\*H. J. FRANKLIN, B.A.Sc.,  
*Demonstrator in Drawing, University of Toronto.*, Toronto, Ont.
- 5.\*J. G. G. FROST, B.A.Sc.,  
*Savell & Frost, Consulting Chemists.*, Cleveland, Ohio.
1. C. H. R. FULLER, B.A.Sc.,  
*Highways Dept., Imperial Oil Co.*, 106 Kendal Ave., Toronto, Ont.
- 7.\*E. I. GILL, B.A.Sc.,  
*Sheppard & Gill Lbr. Co.*, Toronto, Ont.
- 2.\*J. R. GILL, B.A.Sc., Sudbury, Ont.
1. R. W. GOBINLOCK, B.A.Sc.,  
*Canada Bond Corporation, Ltd.*, Toronto, Ont.
7. C. I. GRIERSON, B.A.Sc.,  
*With Imperial Oil Company.*, Hamilton, Ont.
- 3.\*W. H. HALL, B.A.Sc., Toronto, Ont.
- 3.\*G. H. HALLY, B.A.Sc., 215 Avenue Rd., Toronto, Ont.
- 1.\*J. J. HANNA, B.A.Sc., 350 15th Ave. W., Calgary, Alta.
1. J. H. HAWES, B.A.Sc., 245 Wright Ave., Toronto, Ont.
- 1.\*L. T. HAYMAN, B.A.Sc., 869 Dundas St., London, Ont.
- 1.\*B. B. HOGARTH, B.A.Sc., 1132 Victoria Ave., Branden, Man.
4. E. E. HUGLI, B.A.Sc.,  
*With J. J. Lamb, Architect.*, Toronto, Ont.
- 1.\*S. A. HUSTWITT, B.A.Sc., 76 Roncesvalles Ave., Toronto, Ont.
2. W. HUTCHINGS, B.A.Sc., Cobalt, Ont.  
*Chemist, O'Brien Mine.*
- 7.\*A. S. JANNATI, B.A.Sc., Chatham, Ont.  
*With Hydro-Electric Power Commission.*
- 1.\*R. P. JOHNSON, B.A.Sc., Box 245, Niagara Falls, Ont.  
*With Hydro-Electric Power Commission.*
- 7.\*J. I. KAMMAN, B.A.Sc., 35 Hand St., Rochester, N.Y.
1. J. KAY, B.A.Sc. (Died while on active service, 1918).
4. N. G. KEEFER, B.A.Sc., Toronto, Ont.  
*With Wickson & Gregg.*
3. H. S. KERBY, B.A.Sc., Mt. Royal College, Calgary, Alta.
3. J. A. KERR, B.A.Sc.,  
*Polson Iron Works.*, Toronto, Ont.
7. G. E. KEWIN, B.A.Sc., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
1. J. A. KNIGHT, B.A.Sc., Bala, Ont.
- 2.\*S. A. LANG, B.A.Sc. (Died at St. Johns, Que., while on active service, Oct. 1918).
- 7.\*C. W. LATIMER, B.A.Sc., Chatham, Mass.  
*Radio Corporation of America.*
- 1.\*R. E. LINDSAY, B.A.Sc., Bolton, Ont.

\*Degree with honours.

*Dominion Water Power Branch*

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 157

1914—Continued.

7. N. H. LORIMER, B.A.Sc.,  
*Otis-Fenson Elevator Co.* Toronto, Ont.
- 5.\*O. G. LYÉ, B.A.Sc.,  
*Technical Mgr., Malt Products Co., Ltd.* Guelph, Ont.
- 2.\*W. A. MACDONALD, B.A.Sc. (deceased). Galt, Ont.
3. B. MACKENDRICK, B.A.Sc., Woodstock, Ont.
- 2.\*H. J. MACKENZIE, B.A.Sc.,  
7.\*A. M. MACKENZIE, B.A.Sc., *C.E.*,  
*Engineering Dept., Bell Telephone Co.* Montreal, Que.
1. H. N. MACPHERSON, B.A.Sc., 2,306 Rose St., Regina, Sask.
3. A. H. MACQUARIE, B.A.Sc., R.R. No. 1, Merlin, Ont.
7. J. A. MARSHALL, B.A.Sc., Ryckmans, Ont.
- 1.\*J. A. P. MARSHALL, B.A.Sc., *C.E.*, 111 Ellsworth Ave., Toronto, Ont.  
*Dept. Public Highways.*
- 7.\*R. G. MATTHEWS, B.A.Sc., 174 Brant Ave., Brantford, Ont.
- 3.\*H. W. MAXWELL, B.A.Sc., 221 Wellington St., St. Mary's, Ont.  
*Geological Survey.*
- 1.\*R. C. McDONALD, B.A.Sc., Ottawa, Ont.
1. S. B. MCGILL, B.A.Sc., Toronto, Ont.
7. D. L. McLAREN, B.A.Sc., Peterborough, Ont.  
*With Canadian General Electric Co.*
2. P. W. MEAHAN, B.A.Sc., Bathurst Village, N.B.
- 1.\*F. C. MECHIN, B.A.Sc.,  
*Engineer, Imperial Oil Co.* Halifax, N.S.
- 1.\*W. G. MILLAR, B.A.Sc.,  
*With Underwriters' Association.* Toronto, Ont.
- 1.\*A. S. MILLER, B.A.Sc., Peterboro, Ont.  
*Asst. Supt. Eng., Trent Valley Canal.*
- 6.\*W. E. MILLIGAN, B.A.Sc., Toronto, Ont.  
*Lecturer in Metallurgy, University of Toronto.*
- 7.\*P. H. MILLS, B.A.Sc., Osgoode Hall, Toronto, Ont.
- 1.\*J. S. MITCHELL, B.A.Sc., Toronto, Ont.  
*Provincial Highways Department.*
1. J. R. MONTAGUE, B.A.Sc., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
6. D. MORRISON, B.A.Sc., Bowmanville, Ont.  
*Goodyear Tire & Rubber Co.*
1. G. J. MULLINS, B.A.Sc., Toronto, Ont.  
*Harbour Commissioners.*
- 1.\*E. P. MUNTZ, B.A.Sc., St. Catharines, Ont.  
*Welland Ship Canal.*
- 7.\*C. L. NICHOLSON, B.A.Sc., 199 Concord Ave., Toronto, Ont.  
*Toronto Hydro-Electric System.*
- 1.\*J. B. NICHOLSON, B.A.Sc., Excelsior Life Building, Toronto, Ont.  
*J. B. Nicholson, Ltd., Engineers & Contractors.*
- 1.\*C. NOECKER, B.A.Sc., Hamilton, Ont.  
*With Canadian Inspection Co.*
1. J. A. OWENS, B.A.Sc., Toronto, Ont.  
*Asst. Engineer, J. B. Nicholson, Ltd.*
1. A. H. PARKER, B.A.Sc., 598 Manning Ave., Toronto, Ont.
- 1.\*R. G. PATTERSON, B.A.Sc., St. Mary's, Ont.
- 7.\*J. D. PEART, B.A.Sc., Freeman, Ont.
1. C. W. PENNINGTON, B.A.Sc., Dundas, Ont.  
*Valley City Seating Co.*

\*Degree with honours..

## 1914—Continued.

- 1.\*C. V. PERRY, B.A.Sc. (Killed in action, 1917).  
 5.\*W. E. PHILLIPS, B.A.Sc., Kingston, Ont.  
*Frontenac Moulding & Glass Co.*
8. G. O. PHILP, B.A.Sc., Niagara Falls, Ont.  
*Supt. Ontario Power Co.*
1. P. H. RANEY, B.A.Sc. (Killed in action, Belgium, 1917).  
 1. R. H. RICE, B.A.Sc., 27 Roxborough Drive, Toronto, Ont.
7. A. S. ROBERTSON, B.A.Sc., Niagara Falls, Ont.  
*With Hydro-Electric Power Commission.*
- 4.\*J. M. ROBERTSON, B.A.Sc., Toronto, Ont.  
*With McGregor & McIntyre, Ltd.*
7. H. D. ROTHWELL, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. F. S. RUTHERFORD, B.A.Sc., Toronto, Ont.  
*Organizer of Tech. Educ., Dept. of Education.*
- 3.\*J. G. SCOTT, B.A.Sc. (Died while on overseas service, 1918).  
 7.\*F. M. SERVOS, B.A.Sc., Vancouver, B.C.  
*Tudhope Electro Metals, Ltd.*
- 1.\*H. L. SHEPPARD, B.A.Sc., 12 Drayton Ave., Toronto, Ont.  
 1. N. E. D. SHEPPARD, B.A.Sc., Ottawa, Ont.  
*Water Power Branch, Dept. of Interior.*
1. S. SHUPE, B.A.Sc., Toronto, Ont.  
*Inspr., Canadian Fire Underwriters' Association.*
6. A. W. SIME, B.A.Sc., 212 Heath St. W., Toronto, Ont.  
*A.D.C. Government House.*
- 1.\*B. N. SIMPSON, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission*
1. C. E. SINCLAIR, B.A.Sc., Toronto, Ont.  
*With Geo. H. Hees, Son & Co.*
- 1.\*J. B. SKAITH, B.A.Sc., 111 Madison Ave., Toronto, Ont.  
 4.\*W. C. SKINNER, B.A.Sc., 1022 Cass Ave., Detroit, Mich.
1. H. M. SMITH, B.A.Sc. (deceased).  
 2. G. M. SMYTH, B.A.Sc., (deceased) Merriton, Ont.
- 1.\*N. L. SOMERS, B.A.Sc., Sault Ste. Marie, Ont.  
*Coke Plant Engr., Algoma Steel Corp.*
7. R. O. STANDING, B.A.Sc., Inglewood, Ont.  
 7.\*E. C. R. STONEMAN, B.A.Sc., 215 Albany Ave., Toronto, Ont.
1. I. R. STROME, B.A.Sc., Calgary, Alta.  
*Irrigation Engineer, Dept. of Interior.*
3. S. G. TACKABERRY, B.A.Sc., Ottawa, Ont.  
*Chief Mechanical Engineer, Public Works Department.*
2. J. S. TAYLOR, B.A.Sc. (Killed in action, France, 1916).  
 1.\*C. N. TEMES, B.A.Sc., 432 College Street, Toronto, Ont.
- 3.\*E. H. TENNENT, B.A.Sc., 456 Ridout Street, London, Ont.  
 1. J. A. TILSTON, B.A.Sc., Toronto, Ont.  
*Research Assistant, School of Engineering Research, University of  
Toronto.*
- 1.\*G. E. TRELOAR, M.A.Sc., Toronto, Ont.  
 7.\*W. S. TULL, B.A.Sc., Louisburg, N.S.  
*Marconi Wireless Telegraph Co.*
6. E. A. TWIDALE, B.A.Sc. (Killed in action, France, 1917).  
 1.\*F.T. VAN DYKE, B.A.Sc., St. Catharines, Ont.  
*Section 1, Welland Ship Canal.*

\*Degree with honours.

## 1914—Continued

- 3.\*M. F. VERITY, B.A.Sc. Brantford, Ont.  
 1.\*H. O. WADDELL, B.A.Sc., Port Hope, Ont.  
 1.\*H. W. WAGNER, B.A.Sc., Copper Cliff, Ont.  
*International Nickel Co.*
- 1.\*H. D. M. WALLACE, B.A.Sc. (Killed in action, 1917).  
 1. P. L. WHITLEY, B.A.Sc., Gorrie, Ont.  
 6.\*A. E. WIGLE, B.A.Sc., Nobel, Ont.  
*Canadian Explosives Limited.*
- 7.\*J. A. H. WIGLE, B.A.Sc. Kingsville, Ont.  
 4.\*A. C. WILSON, B.A.Sc., 283 Evelyn Ave., Toronto, Ont.  
*Demonstrator, Dept. of Architecture, University of Toronto.*
1. H. P. WILSON, B.A.Sc., Toronto, Ont.  
*Canadian Inspection Co.*
- 2.\*R. W. YOUNG, B.A.Sc., Bothwell, Ont.

## 1915

1. L. S. ADLARD, B.A.Sc., India  
*With British Government.*
1. A. C. ANDERSON, B.A.Sc., 15 Woolfrey Ave., Toronto, Ont.  
*City Architect's Department.*
- 1.\*G. A. ARKSEY, B.A.Sc., 270 N. Lisgar St., Toronto, Ont.  
 2. R. M. ARTHUR, B.A.Sc., Sudbury, Ont.  
 1. F. D. AUSTIN, B.A.Sc., Sault Ste. Marie, Ont.  
*Asst. City Engineer.*
7. W. V. BALL, B.A.Sc., 96A Gothic Ave., Toronto, Ont.  
*Dept. of Physics, University of Toronto.*
- 7.\*T. R. BANBURY, B.A.Sc., *Toronto,* Ingersoll, Ont.  
*Northern Aluminum Co.*
7. V. A. BEACOCK, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
- 1.\*P. BENNETT, B.A.Sc., 705 Fifth Ave. W., Calgary, Alta.  
 7.\*H. M. BLACK, B.A.Sc., Toronto, Ont.  
*With P. W. Ellis.*
7. W. H. BONUS, B.A.Sc., Toronto, Ont.  
*Asst. Superintendent, University of Toronto.*
- 6.\*J. E. BREITHAUPT, B.A.Sc., Kitchener, Ont.  
*With Breithaupt Tanning Co.*
- 1.\*E. D. G. BROUSE, B.A.Sc., 73 St. George St., Toronto, Ont.  
 1.\*L. R. BROWN, B.A.Sc., Sault Ste. Marie, Ont.  
 1.\*F. M. BUCHANAN, B.A.Sc., Sydney, N.S.  
*With Dominion Tar and Chemical Co.*
7. H. C. BUDD, B.A.Sc., Winnipeg, Man.  
*Canadian General Electric Co.*
4. H. J. BURDEN, B.A.Sc., 494 Avenue Road, Toronto, Ont.  
 1. F. N. D. CARMICHAEL, B.A.Sc., 213 Cottingham St., Toronto, Ont.  
 4.\*R. W. CATTO, B.A.Sc., 900 Pingree St., Detroit, Mich.  
 1. R. M. COCKBURN, B.A.Sc., 324 Spadina Road Hill, Toronto, Ont.  
 1.\*J. D. COOK, B.A.Sc. (Killed in action, 1918).
- 1.\*A. B. CREALOCK, B.A.Sc., Toronto, Ont.  
*Willys-Overland, Ltd.*
- 1.\*W. R. DA COSTA, B.A.Sc., 471 Brunswick Ave., Toronto, Ont.  
 1. N. H. DANIEL, B.A.Sc., 24 Prince Arthur Ave., Toronto, Ont.  
*Dept. Soldiers' Civil Re-establishment.*
- 3.\*C. G. DAVEY, B.A.Sc., London, Ont.  
 7.\*G. P. DAVIDSON, B.A.Sc. (Killed in action, 1917).

\*Degree with honours.

## 1915—Continued.

4. J. J. DAVIDSON, B.A.Sc., Humber Bay, Ont.  
 7. W. A. DEAN, B.A.Sc., 561 Avenue Rd., Toronto, Ont.  
 1.\*E. V. DEVERALL, B.A.Sc., 343 Shaw St., Toronto, Ont.  
 7.\*J. DIBBLEE, B.A.Sc., Toronto, Ont.  
*With Hydro-Electric Power Commission.*  
 1.\*W. L. DICKSON, B.A.Sc., 83 St. Clair Ave. E., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1.\*G. A. DOWNEY, B.A.Sc., Orillia, Ont.  
 4. G. R. EDWARDS, B.A.Sc., 1263 King St. W., Toronto, Ont.  
 7.\*R. V. ELLIOTT, B.A.Sc., Toronto, Ont.  
*Northern Aluminum Co.*  
 2. E. R. EMMERSON, B.A.Sc., Port Arthur, Ont.  
 1. A. C. EVANS, B.A.Sc., 592 King St. W., Toronto, Ont.  
*Instructor, Soldiers' Aid Commission.*  
 1. H. S. FALCONER, B.A.Sc. (deceased).  
 7. D. T. FLANNERY, B.A.Sc., 190 University Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1. J. W. H. FORD, B.A.Sc., Box 245, Niagara Falls, Ont.  
*Hydro-Electric Power Commission.*  
 1.\*W. R. FRASER, B.A.Sc., Allandale, Ont.  
*With G. T. Ry.*  
 1. W. G. FRENCH, B.A.Sc., Detroit, Mich.  
*With Edison Co.*  
 1.\*W. J. FULTON, B.A.Sc., Toronto, Ont.  
*G. S. Abrey, O.L.S.*  
 1. R. D. GALBRAITH, B.A.Sc., Toronto, Ont.  
*Canadian Milk Products.*  
 1. C. N. GEALE, B.A.Sc., 304 Rogers St., Peterborough, Ont.  
 6. L. G. GLASS, B.A.Sc., 603 Queen's Ave., London, Ont.  
 1. G. A. GOODERHAM, B.A.Sc. (deceased).  
 7.\*W. H. R. GOULD, B.A.Sc. (Killed in action, 1918).  
 4.\*T. S. GRAHAM, B.A.Sc., 139 Colbeck Ave., Toronto, Ont.  
*City Architect's Dept.*  
 1.\*E. R. GRANGE, B.A.Sc., Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*  
 1. E. D. GRAY, B.A.Sc., Toronto, Ont.  
*Imperial Oil Co.*  
 7. G. D. GRAY, B.A.Sc., Port Colborne, Ont.  
 3. J. GRAY, B.A.Sc., 1135 Catherine St., Victoria, B.C.  
 7. G. E. GRIFFITHS, B.A.Sc., Niagara Falls, Ont.  
*Hydro-Electric Power Commission.*  
 2. M. S. HAAS, B.A.Sc., Toronto, Ont.  
 2. D. S. HALFORD, B.A.Sc., Humboldt, Ariz.  
*Consolidated Arizona Smelting Co.*  
 2.\*W. T. HALL, B.A.Sc. (Killed in action, France, 1917).  
 2.\*J. E. HANLON, B.A.Sc., Arkell, Ont.  
 1. C. HAYWARD, B.A.Sc., Toronto, Ont.  
 2.\*L. T. HIGGINS, B.A.Sc., Rancagua, Chili.  
*Braden Copper Co.*  
 1.\*C. E. HOGARTH, B.A.Sc., 130 Herkimer St., Hamilton, Ont.  
 7. T. P. IRELAND, B.A.Sc., Hamilton, Ont.  
*Hamilton Gas Company.*  
 7.\*G. A. IRONSIDE, B.A.Sc., Ilderton, Ont.

\*Degree with honours.

## 1915—Continued.

1.*C. W. H. JACKSON, B.A.Sc.,	Coboconk, Ont.
7. K. A. JEFFERSON, B.A.Sc.,	Arcola, Sask.
1.*G. W. F. JOHNSON, B.A.Sc.,	127 Perth St., Guelph
7. C. M. JONES, B.A.Sc., <i>Jones &amp; Moore.</i>	Toronto, Ont.
2. R. D. JONES, B.A.Sc.,	300 Spadina Rd. Hill, Toronto, Ont.
1. E. H. JUPP, B.A.Sc., <i>Invalided Soldiers' Commission, College St.</i>	Toronto, Ont.
7. C. R. KEYS, B.A.Sc., <i>Curtiss Aeroplanes and Motors Ltd.</i>	Mineola, N.Y.
5.*H. KOHL, B.A.Sc., <i>Standard Chemical Co.</i>	Longford, Ont.
1.*R. E. LAIDLAW, B.A.Sc., <i>With McCarthy &amp; McCarthy.</i>	Toronto, Ont.
1.*G. J. LAMB, B.A.Sc., <i>Asst. City Engineer.</i>	315 St. Vincent St., Port Arthur, Ont.
7.*G. W. LAWRENCE, B.A.Sc., <i>Sangamo Electric Co., Ltd.</i>	Toronto, Ont.
1.*H. O. LEACH, B.A.Sc. (Killed in action, France, 1918).	
3.*R. H. LLOYD, B.A.Sc.,	Wingham, Ont.
1. W. E. LOCKHART, B.A.Sc. (Killed in action, France, 1917).	
1.*W. E. LONGWORTHY, B.A.Sc.,	2035 Hamilton St., Regina, Sask.
1.*C. T. LOUNT, B.A.Sc.,	Regina, Sask.
1.*R. G. LYD, B.A.Sc.,	49 Dupont Street, Toronto, Ont.
1.*C. A. MACDONALD, B.A.Sc.,	Ridgetown, Ont.
2. I. M. MACDONELL, B.A.Sc.,	35 Prince Arthur Ave., Toronto, Ont.
1.*H. E. MACPHERSON, B.A.Sc.,	St. Thomas, Ont.
1.*W. R. McCAFFREY, B.A.Sc., <i>National Fire Proofing Co. of Canada, Ltd.</i>	45 Albermarle Ave., Toronto, Ont.
1.*C. R. MCCORT, B.A.Sc., <i>Laurentide Paper Co.</i>	Grandmere, Que.
1.*J. P. McDONALD, B.A.Sc., <i>McDonald's Coal Office.</i>	Brantford, Ont.
1.*K. D. McDONALD, B.A.Sc.,	Toronto, Ont.
3.*W. R. McGIE, B.A.Sc.,	Belleville, Ont.
1.*D. F. MCGUGAN, B.A.Sc., <i>Demonstrator in Drawing, University of Toronto.</i>	Toronto, Ont.
7. J. S. MCINTYRE, B.A.Sc., <i>With H.E.P.C.</i>	Toronto, Ont.
1. E. V. MCKAGUE, B.A.Sc., <i>With Elliott &amp; Hume, Barristers.</i>	Kent Bldg., Toronto, Ont.
7. E. T. MARTIN, B.A.Sc.,	Montreal, Que.
1.*W. H. MEITZ, B.A.Sc., <i>Albert Albrecht Co.</i>	Detroit, Mich.
2. F. L. MILLS, B.A.Sc., <i>Royal College of Dental Surgeons.</i>	Toronto, Ont.
1.*G. MITCHELL, B.A.Sc., <i>With Harkness, Loudon &amp; Hertzberg.</i>	Toronto, Ont.
1. J. T. MOGAN, B.A.Sc., <i>Toronto Harbour Commissioners.</i>	Toronto, Ont.
7.*E. M. MONTEITH, B.A.Sc., <i>Imperial Oil Co.</i>	Toronto, Ont.
4.*A. MORRIS, B.A.Sc.,	128 Park Road, Toronto, Ont.
1.*B. M. MORRIS, B.A.Sc. (Killed in action, France, 1917).	

\*Degree with honours.

## 1915—Continued.

5.*W. D. MORRIS, B.A.Sc., <i>Gorman, Eckert Co.</i>	15 Bellevue Ave., London, Ont.
2. J. M. MUIR, B.A.Sc., <i>Dunlop Tire &amp; Rubber Goods Co.</i>	Toronto, Ont.
1.*M. A. NEILSON, B.A.Sc., <i>Inspector, W. H. Banfield &amp; Sons.</i>	Toronto, Ont.
1.*H. S. NICKLIN, B.A.Sc., <i>Asst. to City Engineer.</i>	Guelph, Ont.
1. E. B. O'CONNOR, B.A.Sc.,	Toronto, Ont.
1. W. M. OMAND, B.A.Sc., <i>East Side Works.</i>	Armco, Middleton, Ohio.
1.*R. A. PAUL, B.A.Sc.,	Listowel, Ont.
3.*A. N. PAYNE, B.A.Sc., <i>Mechanical Engineer, Willard's Chocolates, Ltd.</i>	Toronto, Ont.
1. L. P. PEARCE, B.A.Sc.,	Yorkton, Sask.
1.*H. M. PECK, B.A.Sc. (Died in France, 1918).	
1. S. M. PETERKIN, B.A.Sc.,	125 Balsam Ave., Toronto, Ont.
1.*C. F. PORTER, B.A.Sc., <i>Canadian Steel Corporation.</i>	Windsor, Ont.
1.*J. E. PORTER, B.A.Sc.,	Wingham, Ont.
2. W. D. POWELL, B.A.Sc., <i>Chief Engineer, Dominion Steel Products Co., Ltd.</i>	Brantford, Ont.
7. W. F. P. PURDY, B.A.Sc.,	Wardsville, Ont.
1. W. E. RALEY, B.A.Sc. (Died of wounds received in action, 1916).	
1. C. C. RANCE, B.A.Sc., <i>Dept. of Public Highways.</i>	Parliament Buildings, Toronto, Ont.
1.*G. RANKIN, B.A.Sc.,	North Bay, Ont.
1. W. B. REDMAN, B.A.Sc., <i>City Architect's Dept.</i>	Toronto, Ont.
3.*F. G. REID, B.A.Sc., <i>Frantz Premier Co.</i>	Cleveland, Ohio.
5. P. J. RELYEYA, B.A.Sc., <i>Frodingham Iron &amp; Steel Co.</i>	Scunthorpe, England.
1.*A. A. RICHARDSON, B.A.Sc., <i>Dept. Soldiers' Civil Re-establishment.</i>	Peterborough, Ont.
3.*A. S. ROBERTSON, B.A.Sc.,	Walkerton, Ont.
1. J. T. ROSE, B.A.Sc.,	100 Farnham Ave., Toronto, Ont.
7.*A. C. ROSS, B.A.Sc., <i>With Rolls-Royce Co.</i>	Cleveland, Ohio.
2. J. ROSS, B.A.Sc.,	Toronto, Ont.
1.*H. M. ROWE, B.A.Sc.,	Norwich, Ont.
4. G. W. RUTTER, B.A.Sc., <i>With York Knitting Mills.</i>	Toronto, Ont.
7.*E. W. SAVAGE, B.A.Sc., <i>Patent Office, Dept. of Interior.</i>	Ottawa, Ont.
7. A. G. SCOTT, B.A.Sc., <i>American City Bureau.</i>	Tribune Building, New York City.
1.*E. H. SCOTT, B.A.Sc., <i>With C.N. Ry.</i>	725 St. Clair Ave. W., Toronto, Ont.
1.*R. G. SCOTT, B.A.Sc., <i>Canadian Inspection and Testing Laboratories, Ltd.</i>	33 Garnock Ave., Toronto, Ont.
7. N. F. SEYMOUR, B.A.Sc., <i>Hydro-Electric Power Commission.</i>	Toronto, Ont.

\* Degree with honours.

## 1915—Continued.

1.*J. H. SHAW, B.A.Sc., <i>With T. Eaton Co.</i>	Toronto, Ont.
1.*J. S. SHEEHY, B.A.Sc., <i>R. Sheehy &amp; Sons.</i>	Peterborough, Ont.
3. W. G. SHIER, B.A.Sc. (Died of wounds received in action, 1916).	
1.*C. N. SIMPSON, B.A.Sc., <i>Contractor.</i>	Toronto, Ont.
1. R. B. SINCLAIR, B.A.Sc. (Died of pneumonia in England while on overseas service, 1919).	
3. A. H. SMYTH, B.A.Sc.,	Strathroy, Ont.
7.*W. A. STEEL, B.A.Sc., <i>Research Assistant, School of Engineering Research, University of Toronto.</i>	Toronto, Ont.
2. J. B. STITT, B.A.Sc., <i>Braden Copper Co.</i>	Rancagua, Chili.
3. J. D. STONE, B.A.Sc., <i>Campbell Flour Mills.</i>	Toronto, Ont.
7.*G. C. STOREY, B.A.Sc., <i>Cowan Co., Ltd.</i>	Toronto, Ont.
2.*J. E. C. STROUD, B.A.Sc., <i>With Granby Consol'd Mining and Smelting Co.</i>	Anyox, B.C.
7.*A. N. SUHLER, B.A.Sc.,	Pt. Edward, Ont.
7. A. N. TAYLOR, B.A.Sc.,	Toronto, Ont.
3. G. D. TILLSON, B.A.Sc.,	Tillsonburg, Ont.
1. L. B. TILLSON, B.A.Sc.,	Bracebridge, Ont.
1. J. A. TOM, B.A.Sc.,	Goderich, Ont.
5.*W. UFFELMANN, B.A.Sc., <i>Canadian Consolidated Rubber Co.</i>	Montreal, Que.
7.*A. L. WARD, B.A.Sc., <i>Hydro-Electric Power Commission.</i>	Niagara Falls, Ont.
1.*F. E. WEIR, B.A.Sc.,	Burford, Ont.
1.*C. W. WEST, B.A.Sc.,	Campbellford, Ont.
1. J. N. WILLIAMS, B.A.Sc.,	
1.*J. C. WILSON, B.A.Sc.,	Wingham, Ont.
1.*H. A. WOOD, B.A.Sc.,	54 Oakmount Rd., Toronto, Ont.
7. H. K. WYMAN, B.A.Sc., <i>Canadian General Electric Co.</i>	Toronto, Ont.

## 1916.

1. E. B. ALLAN, B.A.Sc., <i>Engr., Logging Div., Laurentide Co. of Grand Mere</i>	La Tuque, Que.
7. F. W. BALL, B.A.Sc., <i>Instructor, Invalided Soldiers' Commission.</i>	Toronto, Ont.
1. L. F. BARNES, B.A.Sc.,	115 Augusta St., Hamilton, Ont.
1. B. W. BEMROSE, B.A.Sc., <i>Demonstrator in Drawing, University of Toronto.</i>	Toronto, Ont.
5.*W. G. BIRRELL, B.A.Sc.,	Pinkerton, Ont.
8.*D. BOYD, B.A.Sc., <i>Dept. of Mining and Metallurgy, Queen's University.</i>	Kingston, Ont.
3. H. E. BREULS, B.A.Sc.,	Toronto, Ont.
5.*N. B. BROWN, B.A.Sc.,	Toronto, Ont.
3. J. R. CHAPMAN, B.A.Sc. (killed in action, France, 1917).	
7.*K. N. CUMMING, B.A.Sc., <i>Radio Corporation of America.</i>	Radio Station, Marian, Mass.
3. J. N. CUNNINGHAM, B.A.Sc. (killed in action, France, 1917).	

\*Degree with honours.

## 1916—Continued.

1. R. S. DALE, B.A.Sc.,  
*Paterson Mfg. Co.* Toronto, Ont.
- 7.\*L. G. DANDENO, B.A.Sc.,  
*With Hydro-Electric Power Commission.* Toronto, Ont.
3. J. L. DELISLE, B.A.Sc.,  
*With Chicoutimi Pulp Co.* Chicoutimi, Que.
1. W. L. DOBBIN, B.A.Sc.,  
*Asst. Town Engineer.* Oshawa, Ont.
1. J. H. EASTWOOD, B.A.Sc., 220 Brock St., Peterborough, Ont.
7. R. L. FLEGG, B.A.Sc., Montreal, Que.
1. D. B. GARDNER, B.A.Sc.,  
*Hydro-Electric Power Commission.* Toronto, Ont.
- 7.\*E. G. GURNETT, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
- 1.\*M. GUROFSKY, B.A.Sc. Box 550, Timmins, Ont.
1. G. C. HAGEDORN, B.A.Sc., 194 Frederick St., Kitchener, Ont.
1. R. M. HARE, B.A.Sc., 247 Brunswick Ave., Toronto, Ont.
1. L. W. HARRON, B.A.Sc.,  
*Hanon's Dye Works.* 869 Bathurst St., Toronto, Ont.
1. C. E. HASTINGS, B.A.Sc., 252 Russell Hill Road, Toronto, Ont.  
*With Overland Car Co.*
4. R. T. C. HOIDGE, B.A.Sc., 560 Dupont Street, Toronto, Ont.
7. S. HUBERT, B.A.Sc.,  
*With Hydro-Electric Power Commission.* Toronto, Ont.
1. K. B. JACKSON, B.A.Sc.,  
*Instr. in Eng., Physics and Photography, University of Toronto.* Toronto, Ont.
- 7.\*H. C. KARN, B.A.Sc.,  
*Hydro-Electric Power Commission.* Toronto, Ont.
7. G. F. KING, B.A.Sc., Simcoe, Ont.
1. J. R. KIRBY, B.A.Sc. (Accidentally killed while on active service, England, 1918).
1. R. W. KIRBY, B.A.Sc., 539 Yonge St., Toronto, Ont.  
*With R. G. Kirby.*
3. R. W. KIRN, B.A.Sc., Peterborough, Ont.  
*Quaker Oats Co.*
5. S. J. KRUG, B.A.Sc.,  
*Demonstrator in Chemical Engineering and Applied Chemistry, University of Toronto.* Toronto, Ont.
1. L. A. C. LEE, B.A.Sc., Parliament Bldgs., Toronto, Ont.  
*Instructor, Invalided Soldiers' Commission.*
- 2.\*B. A. McCRODAN, B.A.Sc. Globe, Ariz.
3. R. A. MACDONALD, B.A.Sc., 220 Church St., Stratford, Ont.
- 1.\*O. MARGISON, B.A.Sc.,  
*Instructor Soldiers' Aid Commission.* Toronto, Ont.
- 1.\*W. B. MITCHELL, B.A.Sc., 150 Wharncliffe Rd., London, Ont.
- 1.\*C. H. NEY, B.A.Sc., Ottawa, Ont.  
*Geodetic Survey, Dept. of the Interior.*
3. J. C. NEWCOMBE, B.A.Sc. (Killed in action, France, 1918).
7. G. E. NOTT, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
1. E. A. O'CALLAGHAN, B.A.Sc., Cornwall, Ont.
- 6.\*C. E. OLIVER, B.A.Sc., 1837 Fern St., Victoria, B.C.
1. N. L. POWELL, B.A.Sc., 288 Dupont St., Toronto, Ont.  
*With R. O. Wynne-Roberts.*

\*Degree with honours.

## 1916—Continued.

Temiskaming, Que.

Toronto, Ont.

1. J. E. PRINGLE, B.A.Sc.,  
*With E. H. Darling, Consulting Engineer on construction, Kipawa Co.*  
7. J. RICHMOND, B.A.Sc.,  
*Northern Electric Co.*
1. H. C. ROSE, B.A.Sc.,  
*Demonstrator in Drawing, University of Toronto.*
- 1.\*S. R. ROSS, B.A.Sc.,  
*Frid Construction Co.*
7. S. W. ROSS, B.A.Sc.,  
*New York and Queens Electric Light and Power Co.*
- 3.\*J. P. RUSSELL, B.A.Sc.,  
27 Whitney Ave., Toronto, Ont.
1. W. B. SCOTT, B.A.Sc.,  
764 Logan Ave., Toronto, Ont.
- 1.\*R. L. SEABORNE, B.A.Sc.,  
*Manager, Laurentian Forest Production Ass'n.*
- 1.\*R. L. SIEVEWRIGHT, B.A.Sc.,  
304 Hogarth Ave., Detroit, Mich.
4. J. L. SKINNER, B.A.Sc.,  
1022 Cass Ave., Detroit, Mich.
7. W. A. SMELSER, B.A.Sc.,  
Hannon, Ont.
7. C. A. SMITH, B.A.Sc.,  
*Hollinger Consolidated Gold Mines.*
1. W. H. STARK, B.A.Sc.,  
*Dunlop Tire & Rubber Goods Co.*
- 1.\*J. A. SUREDA, B.A.Sc.,  
Utuado, Porto Rico.
1. J. E. TREMAYNE, B.A.Sc.,  
*Toronto & York Radial Railway Co.*
- 5.\*F. W. WARD, B.A.Sc.,  
*Harvard University.*
- 1.\*R. C. WARD, B.A.Sc.,  
*Toronto Iron Works.*
7. A. R. WELLS, B.A.Sc.,  
8 Strachan Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
- 7.\*H. S. WEPPLER, B.A.Sc.,  
*With Hydro-Electric Power Commission.*
7. A. E. WIDDICOMBE, B.A.Sc. (deceased).

## 1917.

Chatham, Ont.

Toronto, Ont.

Toronto, Ont.

Toronto, Ont.

Halifax, N.S.

St. Louis, Mo.

Yorkton, Sask.

- 1.\*H. A. BABCOCK, B.A.Sc.,  
*Canadian Des Moines Field Co.*
4. J. BANIGAN, B.A.Sc.,  
*Banigan & Thompson.*
- 1.\*A. E. BERRY, B.A.Sc.,  
*Provincial Board of Health, Exp. Station.*
- 1.\*R. S. C. BOTHWELL, B.A.Sc.,  
280 Park St., Port Arthur, Ont.
7. H. S. BROWN, B.A.Sc.,  
*c/o Halifax Wireless Officer, H.M.A. Dockyard.*
7. S. W. BUMSTEAD, B.A.Sc.,  
*Century Electric Co.*
- 1.\*F. C. CHRISTIE, B.A.Sc.,  
*With H. K. Moberley, D.L.S.*
7. J. C. COLLERAN, B.A.Sc.,  
R.R. No. 5, Hamilton, Ont.
1. E. H. CORMAN, B.A.Sc.,  
Columbia University, New York, N.Y
- 5.\*J. V. DICKSON, B.A.Sc.,  
Windsor, Ont.
1. J. A. FRASER, B.A.Sc.,  
*Canadian Conduit Co.*
7. J. I. GRAM, B.A.Sc.,  
*Ontario Power Co.*

\*Degree with honours.

1917—Continued.

- |   |   |
|---|---|
| 1. W. K. GREATREX, B.A.Sc.,<br><i>Demonstrator in Drawing, University of Toronto.</i>   | Toronto, Ont.                                       |
| 2. G. HANMER, B.A.Sc.,  | Ralph, Sask.  |
| 3. A. B. HARRIS, B.A.Sc.,   |   |
| 1. R. W. HARRIS, B.A.Sc.,<br><i>C. H. &amp; P. H. Mitchell.</i>   | Toronto, Ont.                                       |
| 5. A. J. HOLDEN, B.A.Sc.,<br><i>Chemist, Wm. Neilson, Ltd.</i>  | Toronto, Ont.                                       |
| 1.*R. W. HURLBURT, B.A.Sc.,<br><i>Canadian Inspection &amp; Testing Laboratories, Ltd.</i>                                    | Toronto, Ont.                                       |
| 7. G. F. HUTCHESON, B.A.Sc.,  | Huntsville, Ont.                                    |
| 7. L. LEVESQUE, B.A.Sc. (deceased).   |   |
| 3. S. G. McCANDLISH, B.A.Sc.,   |   |
| 2.*H. L. MCCLELLAND, B.A.Sc.,<br><i>Skead Gold Syndicate.</i>   | 21 Smith Ave., Hamilton, Ont.                       |
| 3. P. E. McILHARGEY, B.A.Sc.,<br><i>Lincoln Electric Co.</i>  | Toronto, Ont.                                       |
| 5. G. G. MACDONALD, B.A.Sc.,<br><i>Demonstrator in Chemical Engineering and Applied Chemistry,<br/>University of Toronto.</i> | Toronto, Ont.                                       |
| 1.*R. C. MANNING, B.A.Sc.,  | 203 Hunter St. W., Hamilton, Ont.                   |
| 3.*A. S. MATHERS, B.A.Sc.,<br><i>Architect.</i>   | 368 Manning Ch., Toronto, Ont.                      |
| 1. J. E. O'BRIEN, B.A.Sc.,<br><i>With J. V. Gray Const. Co.</i>   | Toronto, Ont.                                       |
| 7.*W. A. R. OFFERHAUS, B.A.Sc.,<br><i>U.S. Light &amp; Heat.</i>  | Niagara Falls, N.Y.                                 |
| 1. H. A. PARR, B.A.Sc.,<br><i>Post Graduate Work, Massachusetts Institute of Technology.</i>                                  | Boston, Mass.                                       |
| 1.*R. D. RATZ, B.A.Sc.,   | 14 Kennedy Ave., West Toronto, Ont.                 |
|   | <i>Canadian Inspection &amp; Testing Laboratory</i> |
| 1. E. E. SMITH, B.A.Sc.,  | Steelton, Ont.                                      |
| 7. E. W. SMITHSON, B.A.Sc.,   | 619 Waterloo St., London, Ont.                      |
| 3.*A. M. SNIDER, B.A.Sc.,<br><i>Can. Ingersoll Rand Co.</i>   | Sherbrooke, Que.                                    |
| 1. R. M. SPEIRS, B.A.Sc.,<br><i>With Bell Telephone Co.</i>   | Toronto, Ont.                                       |
| 3. A. W. SWAN, B.A.Sc.,<br><i>Asst. Secretary, Engineering Institute of Canada.</i>   | Montreal, Que.                                      |
| 1. A. P. THOMSON, B.A.Sc.,  | Toronto, Ont.                                       |
| 1.*C. E. TILSTON, B.A.Sc.,<br><i>With Willys-Overland, Ltd.</i>   | 112 Marchmont Rd., Toronto, Ont.                    |
| 7. O. W. TITUS, B.A.Sc.,<br><i>Demonstrator in Thermodynamics, University of Toronto.</i>                                     | Toronto, Ont.                                       |
| 2. B. C. TOMLINSON, B.A.Sc.,  | Sudbury, Ont.                                       |
| 1.*V. TOPPING, B.A.Sc.,<br><i>On Overseas Service.</i>  |   |
| 7.*A. A. TUFFORD, B.A.Sc.,<br><i>Salesman, Northern Electric Co.</i>  | Vancouver, B.C.                                     |
| 7. H. A. TUTTLE, B.A.Sc.,<br><i>Research Asst., School of Eng. Research, University of Toronto.</i>                           | Toronto, Ont.                                       |
| 5 E. J. TYRRELL, B.A.Sc.,<br><i>Research Chemist, T. Eaton Co.</i>  | Toronto, Ont.                                       |

\*Degree with honours.

## 1917—Continued.

- 4.\*H. R. WATSON, B.A.Sc., 907 Excelsior Life Bldg., Toronto, Ont.  
*Architect.*
1. G. WOOD, B.A.Sc., Kincardine, Ont.

## 1918

- 6.\*C. C. ANDERSON, B.A.Sc., Windsor, Ont.  
 7. J. G. BALLINGER, B.A.Sc., Streetsville, Ont.  
 7.\*C. K. DUFF, B.A.Sc., Toronto, Ont.  
*Research Assistant, School of Engineering Research, University of Toronto.*
1. F. D. ELLIS, B.A.Sc., 55 Lee Ave., Toronto, Ont.  
*Sarnia Bridge Co., Ltd.*
1. H. W. J. FAIRCLOUGH, B.A.Sc., 214 George St., Hamilton, Ont.
7. R. A. FRASER, B.A.Sc., Toronto, Ont.  
*Dept. Soldiers' Civil Re-establishment.*
6. C. W. HANCOCK, B.A.Sc., Kitchener, Ont.  
*Salts & Potash Co. of Canada.*
7. B. HYMAN, B.A.Sc., 182 Baldwin Street, Toronto, Ont.
7. E. F. JOHNSTON, B.A.Sc., Sherbrooke, Que.  
*Canadian Ingersoll Rand Co.*
- 1.\*N. G. McDONALD, B.A.Sc., Toronto, Ont.  
*Demonstrator in Hydraulics, University of Toronto.*
- 7.\*E. W. MCLEOD, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*Hydro Electric Power Commission*
2. C. E. MACDONALD, B.A.Sc., Toronto, Ont.  
*International Nickel Co. of Canada, Ltd.*
1. C. O. MADDOCK, B.A.Sc., Toronto, Ont.  
*E. A. James & Co.*
1. A. R. MENDIZABAL, B.A.Sc., Toronto, Ont.  
*With Willys-Overland, Ltd.*
1. R. C. MITCHELL, B.A.Sc., Toronto, Ont.  
*Lecturer in Hydraulics, University of Toronto.*
- 7.\*W. H. ORR, B.A.Sc., Toronto, Ont.  
*Demonstrator in Electrical Engineering, University of Toronto.*
1. G. P. PEARSON, B.A.Sc., Schomberg, Ont.
- 1.\*J. ROVSKY, B.A.Sc., 121 Maria Street, Toronto
1. W. L. SAGAR, B.A.Sc., Toronto, Ont.  
*Fellow in Applied Mechanics, University of Toronto.*
- 1.\*M. SAMUEL, B.A.Sc., 7 Bellevue Place, Toronto, Ont.
- 1.\*C. R. SCOTT, B.A.Sc., Toronto, Ont.  
*With E. A. James & Co., Ltd.*
2. J. G. SHEPLEY, B.A.Sc., (Died while on active service, England, 1918).
- 7.\*W. G. WOONTON, B.A.Sc., Toronto, Ont.  
*Demonstrator Electrical Engineering, University of Toronto.*

## 1919

7. W. D. BROWN, B.A.Sc., Forester's Falls, Ont.
- 1.\*W. J. BROWNE, B.A.Sc., Merton College, Oxford, England.  
*Rhodes Scholar.*
1. H. J. CALDWELL, B.A.Sc., 148 Beatrice St., Toronto, Ont.
3. T. W. CAMPBELL, B.A.Sc., Toronto, Ont.  
*Sales Dept., C. A. Dunham Co.*
5. J. E. CLARK, B.A.Sc., Toronto, Ont.  
*Demonstrator in Analytical Chemistry, University of Toronto.*

\*Degree with honours.

## 1919—Continued.

6. A. R. CLARRY, B.A.Sc., Kingston, Ont.  
*Lecturer in Chemistry, Royal Military College.*
1. E. C. COWAN, B.A.Sc., 707 McMillan Ave., Ft. Rouge, Winnipeg, [Man.]
1. H. L. DOWLING, B.A.Sc., 445 Grace St., Toronto, Ont.  
*With McGregor & McIntyre.*
7. R. A. DURAND, B.A.Sc., Toronto, Ont.  
*With Ford Motor Co. of Canada.*
1. C. W. EDMONDS, B.A.Sc., Toronto, Ont.  
*With C. H. & P. H. Mitchell.*
6. J. H. FORMAN, B.A.Sc., New Toronto, Ont.  
*Goodyear Tire & Rubber Co. of Canada, Ltd.*
- 7.\*J. M. HARKINS, B.A.Sc., Toronto, Ont.  
*With Dunlop Tire & Rubber Goods Co.*
- 7.\*J. E. HESS, B.A.Sc., Peterborough, Ont.  
*With Canadian General Electric Co.*
1. G. H. HOPPER, B.A.Sc., 537 Ossington Ave., Toronto, Ont.  
*With Magic Baking Powder Co.*
1. S. H. JOHNSTON, B.A.Sc., Toronto, Ont.  
*With Harkness, Loudon & Hertzberg.*
- 1.\*N. KEARNS, B.A.Sc., Niagara Falls, Ont.  
*In Office of City Engineer.*
3. L. J. LESPERANCE, B.A.Sc., R.R. No. 3, Essex, Ont.
1. F. J. MATTHEWS, B.A.Sc., 208 Kent Building, Toronto, Ont.  
*With H. H. Robertson Co., Ltd.*
- 3.\*W. A. MOLLARD, B.A.Sc., 46 Albany Ave., Toronto, Ont.  
*With John M. Lyle.*
1. W. B. MACINTYRE, B.A.Sc., Toronto, Ont.  
*With Willys-Overland, Ltd.*
- 1.\*N. MACNICOL, B.A.Sc., Windsor, Ont.  
*Morris Knowles Co.*
1. J. R. MCCOLL, B.A.Sc., 37 Wall St., New York, N.Y.  
*With Westinghouse, Church, Kerr Int.*
1. H. B. NORWICH, B.A.Sc., Toronto, Ont.  
*With Wm. F. Sparling & Co.*
3. R. T. PARK, B.A.Sc., 715 Bethune St., Peterborough, Ont.
3. W. B. PATERSON, B.A.Sc., Toronto, Ont.  
*American Blower Co.*
7. W. M. REID, B.A.Sc., Vinemount, Ont.
- 7.\*H. ROSE, B.A.Sc., Peterborough, Ont.  
*With Canadian General Electric Co.*
1. G. B. SNOW, B.A.Sc., 216 Balmoral Ave., Toronto, Ont.  
*With Canadian National Railway.*
1. D. K. C. STRATHEARN, B.A.Sc., Morrisburg, Ont.  
*With Hydro-Electric Power Commission.*
6. A. A. SWINNERTON, B.A.Sc., Ottawa, Ont.  
*Department of Mines.*
7. A. L. TENNYSON, B.A.Sc., Peterborough, Ont.  
*With Canadian General Electric Co.*
7. A. M. THOMAS, B.A.Sc., Toronto, Ont.  
*Research Assistant, School of Engineering Research, University of  
 Toronto.*

\*Degree with honours

CERTIFICATES.  
MINERALOGY AND ASSAYING.

1896. G. JOHNSTON.  
1897. E. B. WEBSTER.  
1901. G. A. HUNT.

ELECTRICITY.

1896. A. T. TYE, c/o Empresa Hanseatica, Barranquilla, Columbia, South America.  
1898. A. N. McMILLAN, Penetanguishene, Ont.  
1900. A. H. SMITH.  
1896. E. I. SIFTON, London, Ont.  
*Manager, London Electric Construction Co.*  
1903. W. ELWELL (deceased).

## INDEX TO GRADUATES.

In the following alphabetical list of the Graduates is given the year of graduation of each student. In the preceding list, which is arranged by classes in the order of graduation, may be found additional information as to occupation, addresses, etc.

## A

Abendana, E. M. (deceased) . . . . .	1914	Anderson, R. M. . . . .	1908
Acres, H. G. . . . .	1903	Anderson, A. S. (deceased) . . . . .	1913
Adams, J. H. . . . .	1910	Andrews, E. . . . .	1897
Adams, O. F. . . . .	1910	Andrews, F. C. (deceased) . . . . .	1914
Adlard, L. S. . . . .	1915	Angus, H. H. . . . .	1903
Adsett, F. C. . . . .	1914	Angus, R. W. . . . .	1894
Agnew, N. J. . . . .	1910	Apsey, J. F. . . . .	1888
Aitken, J. . . . .	1911	Archer, E. G. . . . .	1911
Akers, H. G. (deceased) . . . . .	1908	Ardagh, A. G. . . . .	1893
Alexander, J. H. . . . .	1904	Ardagh, E. G. R. . . . .	1900
Alison, T. H. . . . .	1892	Arens, A. H. . . . .	1906
Alison, J. G. R. . . . .	1903	Arens, H. W. (deceased) . . . . .	1905
Allan, E. B. . . . .	1916	Arens, R. J. . . . .	1908
Allan, J. R. . . . .	1892	Arens, E. G. . . . .	1909
Allan, J. L. . . . .	1900	Arksey, G. A. . . . .	1915
Allan, L. F. . . . .	1908	Armer, C. E. . . . .	1914
Allan, L. B. . . . .	1911	Armer, J. C. . . . .	1906
Allen, F. G. . . . .	1907	Armour, R. H. . . . .	1905
Allen, R. J. . . . .	1913	Armstrong, J. . . . .	1895
Allison, C. B. . . . .	1908	Armstrong, H. V. . . . .	1909
Alport, F. . . . .	1906	Arthur, R. M. . . . .	1915
Alton, J. L. . . . .	1914	Ashbridge, W. T. . . . .	1888
Amos, W. L. . . . .	1906	Augustine, A. P. . . . .	1907
Amsden, W. G. (deceased) . . . . .	1910	Austin, E. T. . . . .	1909
Anderson, A. C. . . . .	1915	Austin, F. D. . . . .	1915
Anderson, A. G. . . . .	1892	Avery, C. R. . . . .	1913
Anderson, C. C. . . . .	1918	Aylesworth, C. B. . . . .	1905
Anderson, F. J. (deceased) . . . . .	1907		

## B

Babcock, H. A. . . . .	1917	Barber, H. C. . . . .	1908
Badgley, L. A. . . . .	1911	Barber, H. G. . . . .	1902
Bain, J. A. (deceased) . . . . .	1900	Barber, T. . . . .	1899
Bain, J. W. . . . .	1896	Barber, W. . . . .	1905
Baird, J. A. . . . .	1910	Barker, H. F. . . . .	1894
Baird, W. J. . . . .	1910	Barley, J. H. . . . .	1900
Baker, M. H. . . . .	1906	Barnes, L. F. . . . .	1916
Baldwin, F. W. . . . .	1906	Barnett, H. A. . . . .	1910
Baldwin, L. C. M. . . . .	1913	Barrett, R. H. (deceased) . . . . .	1901
Ball, E. F. . . . .	1888	Barrett, J. H. . . . .	1904
Ball, F. W. . . . .	1916	Barry, W. H. . . . .	1909
Ball, W. V. . . . .	1915	Bartlett, E. . . . .	1908
Ballantyne, H. F. . . . .	1893	Bartley, T. H. . . . .	1911
Ballinger, J. G. . . . .	1918	Bates, M. (deceased) . . . . .	1906
Banbury, T. R. . . . .	1915	Batten, H. L. . . . .	1911
Banigan, J. . . . .	1917	Beacock, V. A. . . . .	1915
Banks, H. R. . . . .	1914	Beatty, F. W. . . . .	1913
Banting, E. W. . . . .	1906	Beatty, W. B. . . . .	1913
Barber, F. . . . .	1906	Beatty, H. J. . . . .	1891

## FACULTY OF APPLIED SCIENCE AND ENGINEERING. 171

Beatty, W. G.	1901	Bow, J. A.	1897
Beatty, J. A.	1903	Bowen, G. H.	1909
Beauregard, A. T.	1894	Bower, J. H. W.	1914
Beckstedt, R.D.S.	1909	Bowers, W. J. (deceased)	1901
Bedard, E. L.	1914	Bowes, H. F.	1908
Bedard, H. J.	1914	Bowman, A. M.	1886
Bedford, F. J. (deceased)	1908	Bowman, E. P.	1910
Begg, W. A.	1905	Bowman, F.	1911
Beth, R. E.	1909	Bowman, F. M.	1890
Belcher, J. T.	1914	Bowman, H. D.	1907
Bell, C. A.	1913	Bowman, H. J.	1885
Bell, G. G.	1905-1908	Boyd, D.	1916
Bell, R. S.	1913	Boyd, D. G.	1894
Bellisle, J. P. (deceased)	1906	Boyd, W. H.	1898
Bemrose, B. W.	1916	Brace, J. H.	1908
Bennett, G. A.	1909	Brackinreid, T. W.	1911
Bennett, P.	1915	Brady, W. S.	1907
Bennett, S. G.	1914	Brandon, E. T. J.	1901
Bergey, A. E.	1894	Brandon, H. E.	1906
Berkeley, G. L.	1911	Bray, L. T.	1900
Berry, A. E.	1917	Brebner, G. (deceased)	1895
Berry, E. W.	1910	Brecken, P. R.	1908
Bertram, G. M.	1910	Breithaupt, J. E.	1915
Betts, H. H.	1906	Brereton, L. R.	1913
Beynon, D. E.	1906	Brereton, W. P.	1901
Billings, J. H.	1911	Breslove, J.	1903
Bingham, H. C.	1910	Breuls, H. E.	1916
Binns, P. V. (deceased)	1914	Brian, M. E.	1906
Binns, R. E.	1913	Bristol, W. M.	1905
Birchard, E. R.	1909	Broadfoot, F. C.	1906
Birrell, W. G.	1916	Brock, A. F.	1910
Bissett, D. G.	1910	Brock, W. M.	1911
Bissett, G. W. (deceased)	1906	Brodie, W. M.	1895
Bissett, J. R.	1911	Broughton, G. H.	1907
Black, B. S.	1913	Broughton, J. T.	1902
Black, G. E.	1908	Brouse, E. D. G.	1915
Black, H. M.	1915	Brouse, W. H. D.	1911
Black, W. D.	1909	Brown, B.	1913
Blackwell, R. H. H.	1910	Brown, C. E.	1909
Blackwood, A. E.	1895	Brown, D. B.	1888
Blackwood, W. C.	1906	Brown, E. I.	1908
Blain, D.	1913	Brown, G. L.	1893
Blair, W. J.	1902	Brown, H. O.	1911
Bleakley, J. F.	1885	Brown, H. H.	1914
Blizard, D. C.	1909	Brown, H. S.	1917
Blyth, J. M.	1914	Brown, J. A.	1907
Boeckh, J. C.	1906	Brown, J. M.	1902
Bonham, A. R.	1914	Brown, L. L.	1895
Bonnell, M. B.	1904	Brown, L. R.	1915
Bonter, E. R.	1913	Brown, N. B.	1916
Bonus, W. H.	1915	Brown, T. D.	1904
Boswell, E. J.	1895	Brown, T. W.	1906
Boswell, M. C.	1900	Brown, W. D.	1914
Boswell, W. O. (deceased)	1911	Brown, W. D.	1919
Bothwell, R. S. C.	1917	Browne, E. W.	1909
Boulton, W. J.	1909	Browne, M. O.	1910
Bourne, O. B.	1907	Browne, W. J.	1919
Boustead, W. E. (deceased)	1890	Bruce, W. J.	1907

Bryce, W. F. M.	1908	Burgess, J. R.	1910
Buchan, P. H.	1908	Burley, R. J.	1904
Buchanan, F. M.	1915	Burns, D. (deceased)	1883
Buchanan, J. A.	1909	Burns, J. C. (deceased)	1887
Buchanan, T. R.	1913	Burns, J. E.	1909
Buchanan, W. B.	1913	Burnham, F. W.	1904
Bucke, M. A. (deceased)	1890	Burnham, N. G. H. (deceased)	1910
Bucke, W. A.	1894	Burnside, J. T. M. (deceased)	1899
Budd, H. C.	1915	Burrows, B. H. A. (deceased)	1913
Bumstead, S. W.	1917	Burwash, L. T.	1896
Bunnell, A. E. K.	1906	Burwash, N. A.	1903
Burd, J. H.	1903	Bush, C. E.	1907
Burden, H. J.	1915	Byam, F. M.	1906
Burgess, E. L.	1903		

## C

Cain, E. T.	1911	Carter, J. M.	1914
Calder, J. W.	1904	Carter, W. E. H. (deceased)	1898
Caldwell, H. J.	1919	Caster, J. H.	1907
Caldwell, W. B.	1913	Catto, R. W.	1915
Cale, W. C.	1910	Caudwell, N. S.	1910
Cameron, N. C.	1904	Cavell, E.	1907
Cameron, A.	1906	Chace, W. G.	1901
Cameron, M. G.	1909	Chadwick, R. E. C.	1906
Cameron, C. S.	1911	Chadwick, W. W.	1911
Cameron, O. L. (deceased)	1913	Challen, G.	1908
Campbell, A. D.	1910	Challies, J. B.	1904
Campbell, A. J.	1904	Chalmers, W. J.	1889
Campbell, A. M.	1904	Chalmers, J.	1894
Campbell, D. H.	1914	Chambers, E. V.	1914
Campbell, H. M.	1914	Chandler, R. B.	1911
Campbell, J. J. (deceased)	1914	Chapman, J. R. (deceased)	1916
Campbell, W. G.	1902	Charlesworth, L. C.	1893
Campbell, A. R. (deceased)	1902	Charlton, H. W.	1897
Campbell, R. J.	1895	Chase, A. V.	1905
Campbell, G. M.	1896	Cherry, P. G.	1911
Campbell, L. L.	1913	Chesnut, A. W. (deceased)	1910
Campbell, W. C.	1905	Chesnut, E. F.	1911
Campbell, N. A.	1908	Chesnut, F. H.	1908
Campbell, R. A.	1909	Chesnut, V. S.	1909
Campbell, A. W.	1906	Chewett, H. J.	1888
Campbell, J. E.	1908	Chilver, C. A.	1904
Campbell, C. D.	1911	Chilver, H. L.	1904
Campbell, T. W.	1919	Chisholm, D. C.	1910
Candee, C. N.	1914	Christie, F. C.	1917
Canniff, C. M.	1888	Christie, W.	1902
Carey, B.	1889	Christie, U. W.	1904
Carlyle, R. T.	1914	Christie, A. G.	1901
Carlyle, W. M. (deceased)	1910	Christie, R. M.	1914
Carmichael, C. G. (deceased)	1902	Chubbuck, L. B.	1899
Carmichael, F. N. D.	1915	Clark, H.	1913
Carmichael, R. M.	1913	Clark, J.	1900
Carpenter, H. S.	1897	Clark, G. T.	1906
Carrie, G. M.	1913	Clark, F. W.	1911
Carroll, A. M.	1908	Clark, H. J.	1911
Carroll, M. J.	1906	Clark, J. E.	1919
Carscallen, H. R.	1908	Clarke, F. F.	1903
Carson, W. R.	1905	Clarry, A. R.	1919

Clarkson, G. E.	1913	Corman, E. H.	1917
Claveau, J. A.	1910	Corman, W. E.	1909
Cleary, F. S. (deceased)	1911	Cornell, C. W.	1911
Clegg, B. D.	1913	Corrigan, G. D. (deceased)	1890
Clement, W. A.	1889	Corrigan, T. E.	1905
Clement, S. R. A.	1905	Cory, R. Y.	1908
Cline, C. G.	1909	Coulson, C. L.	1903
Clipsham, K. M.	1914	Courtice, E. D. W.	1914
Clothier, G. A.	1899	Cousins, E. L.	1906
Coates, P. C.	1904	Coulthard, R. W.	1899
Cockburn, J. R.	1901	Cowan, E. C.	1919
Cockburn, L. S.	1910	Cowan, W. A.	1904
Cockburn, R. M.	1915	Cowper, G. C.	1907
Code, A. G.	1910	Coyne, H.	1908
Code, S. B.	1904	Craig, J. A.	1899
Code, T. F. (deceased)	1904	Craig, J. H.	1910
Cole, D. B.	1911	Craig, S. E.	1904
Cole, W. E. (deceased)	1908	Crashley, J. W.	1914
Cole, C. R.	1910	Crawford, A. W.	1914
Coleman, J. H.	1913	Crealock, A. B.	1915
Coleman, R. M.	1907	Creighton, A. G.	1906
Colhoun, G. A.	1906	Crerar, S. R.	1904
Colleran, J. C.	1917	Crosby, N. L. R.	1905
Collett, W. C.	1908	Crosby, T. H.	1909
Collinson, J. G.	1909	Crouch, M. E.	1911
Colquhoun, G. A.	1910	Cruthers, W. M.	1911
Coltham, G. W.	1909	Culbert, M. T. (deceased)	1902
Conlon, F. T. (deceased)	1902	Culbert, J. V.	1907
Connell, C. B. B.	1907	Cumming, J. D.	1908
Connor, H. V.	1902	Cumming, R.	1916
Connor, A. W.	1895	Cumming, K.	1902
Cooch, H. A.	1909	Cummins, O. F.	1911
Cook, A. S.	1911	Cunerty, T. J.	1911
Cook, G. M.	1913	Cunningham, C. H.	1911
Cook, J. D. (deceased)	1915	Cunningham, J. N. (deceased)	1916
Cook, W. A. Mc.	1906	Cunningham, R. H.	1909
Coombs, J. A.	1913	Currie, W. M.	1904
Coon, B. R.	1913	Curtis, W. T.	1913
Cooper, C.	1899	Curzon, J. H.	1911
Corbould, C. E. B.	1914	Cuthbertson, W.	1914

**D**

Da Costa, W. R.	1915	Davey, C. G.	1915
Dahl, A. D.	1908	Davidson, R. D.	1914
Dale, R. S.	1916	Davidson, G. P. (deceased)	1915
Dallyn, F. A.	1909	Davidson, J. J.	1915
D'Alton, F. K.	1911	Davis, R.	1907
Dalton, G. F.	1914	Davis, A. I.	1909
Dandeno, L. G.	1916	Davis, H. W.	1909
Daniel, N. H.	1915	Davis, H. C.	1909
Daniels, W. N.	1906	Davis, W. B.	1911
Danks, F. A.	1908	Davison, J. E.	1900
Danks, C. N.	1909	Davison, A. E.	1903
Dann, E. M. (deceased)	1909	Dawson, I. H. (deceased)	1909
Darling, E. H.	1898	Deacon, T. R.	1891
Darroch, J.	1908	Dean, C. D.	1910
Dashwood, R.	1914	Dean, W. A.	1915
Dates, A. J.	1913	Death, N. P. F.	1909

DeCew, J. A.	1896	Dodds, W. A.	1909
De Guerre, F. C. (deceased)	1911	Doncaster, L. W.	1911
Deitch, E. L.	1913	Doorly, H. C. (deceased)	1908
Delahaye, W. H.	1909	Douglas, F. W.	1914
Delamere, R. D.	1914	Douglas, R. H.	1908, 1909
De Laporte, A. V.	1910	Douglas, W. E.	1902
Delisle, J. L.	1916	Dowling, H. L.	1919
Depew, H. H.	1904	Downey, G. A.	1915
Derham, W. P.	1909	Downing, F. H.	1911
Deverall, E. V.	1915	Duff, A. R.	1909
Diamond, R. W.	1913	Duff, C. K.	1918
Dibblee, J.	1915	Duff, J. A. (deceased)	1890
Dickinson, E. D.	1900	Duff, W. A.	1901
Dickson, G. W.	1900	Duggan, G. H.	1883
Dickson, J. V.	1917	Dunbar, W. B.	1911
Dickson, W. L.	1915	Duncan, J. M.	1910
Dill, C. W.	1891	Duncan, W. G.	1913
Dixon, H. A.	1900	Dundass, C. S.	1906
Dobbin, R. L.	1910	Dunlop, R. J.	1902
Dobbin, W. L.	1916	Dunn, T. H.	1893
Dobie, J. S.	1895	Durand, R. A.	1919
Dobson, W. P.	1910	Dyer, F. C.	1908

**E**

Eagleson, F. M.	1908	Elliott, J. C.	1899
Eason, D. E.	1901	Ellis, F. D.	1918
Eastwood, J. H.	1916	Ellis, S. D. (deceased)	1914
Eckert, C. H.	1911	Elwell, W. (deceased).	1902
Edmonds, C. W.	1919	Emery, V. H.	1910
Edwards, W. M.	1902	Emmerson, E. R.	1915
Edwards, C.	1908	Empey, J. M.	1902
Edwards, G. R.	1915	English, A. B. (deceased).	1890
Edwards, H. C.	1914	Evans, A. C.	1915
Elder, A. J.	1904	Evans, S. D.	1907
Elliot, J. A.	1911	Evans, S. L.	1908
Elliot, R. V.	1915	Evans, W. J.	1910
Elliott, J. A.	1914	Ewart, J. A.	1894
Elliott, G. R.	1911	Ewart, F. R.	1907
Elliott, C. F.	1911	Ewing, E. O.	1908
Elliott, H. F.	1914	Eyres, H. E.	1914
Elliott, H. P.	1896		

**F**

Fairbairn, J. M. R.	1893	Ferguson, J. W.	1910
Fairchild, C.	1892	Fergusson, A. T.	1909
Fairclough, H. W. J.	1918	Fierheller, H. S. (deceased)	1905
Fairlie, H. W.	1910	Fingland, W.	1893
Falconer, F. S.	1909	Fiddes, F. R.	1913
Falconer, H. S. (deceased)	1915	Fisken, J. B. K.	1910
Falls, O. M.	1914	Flanagan, O. L.	1908
Fargey, T. A.	1909	Flannery, D. T.	1915
Farrell, K. A.	1911	Fleck, J. G.	1904
Farrelly, T. J.	1911	Flegg, R. L.	1916
Fear, S. L.	1906	Fleming, D. H.	1913
Fensom, C. J.	1903	Fleming, G. O.	1914
Ferguson, C. R.	1910	Fleming, G. R. S. (deceased)	1907
Ferguson, D. G.	1914	Fleming, J. S. (deceased)	1914
Ferguson, G. H.	1905	Fletcher, A. W.	1910
Ferguson, J. B.	1909	Fletcher, F. T.	1910

Fletcher, J. A.	1910	Francis, G. C.	1908
Flint, C.	1908	Frankel, E. L.	1911
Flint, T. R. C.	1910	Franklin, H. J.	1914
Flook, S. E.	1911	Fraser, A. (deceased)	1910
Flynn, C. C.	1911	Fraser, J. A.	1917
Follett, R. C. (deceased)	1910	Fraser, R. A.	1918
Foote, F. F.	1913	Fraser, W. R.	1915
Forbes, D. L. H.	1902	Fredin, J.	1910
Ford, Å. L.	1904	Freeland, E. E.	1911
Ford, J. W. H.	1915	Freeman, T. E.	1909
Foreman, J. L.	1914	Freeman, J. R.	1911
Foreman, J. M.	1910	French, W. G.	1915
Forman, J. H.	1919	Frid, H. P.	1911-1915
Forman, W. E.	1899	Frost, E. R.	1909
Forrester, C.	1893	Frost, J. G. G.	1914
Forward, E. A.	1897	Fuce, E. O.	1903
Forward, C. C.	1906	Fuller, C. H. R.	1914
Foster, A. H.	1908	Fuller, R. J.	1911
Foster, W. J.	1910	Fullerton, C. H.	1900
Foulds, W. C.	1910	Fulton, W. J.	1915
Francis, Walter J.	1893	Fux, P. C.	1907

*Gage & Co.* 1918 G

Gaby, F. A.	1903	Goodwin, A. C.	1902
Gagné, S. (deceased)	1901	Goodwin, J. B.	1892
Galbraith, J. S.	1913	Gordon, J. P.	1904
Galbraith, R. D.	1915	Gordon, W. A.	1910
Gall, H.	1910	Gouinlock, R. W.	1914
Galletly, J. S.	1907	Gould, W. H. R. (deceased)	1915
Galt, G. (deceased)	1907	Gourlay, V. F.	1910
Gardner, D. B.	1916	Gourlay, W. A.	1903
Gardner, J. C.	1903	Graham, C. W. (deceased)	1906
Garland, M. L.	1890	Graham, E. B.	1910
Garnham, W. H. (deceased)	1913	Graham, G. W.	1907
Garrow, A. B.	1907	Graham, D. A.	1909
Geale, C. N.	1915	Graham, T. S.	1915
Gear, S. S.	1908	Gram, J. I.	1917
George, R. E. (deceased)	1903	Grange, E. R.	1915
Gibbons, J.	1888	Grant, W. F. (deceased)	1898
Gibson, A. E.	1902	Grant, R. R.	1909
Gibson, J. M.	1910	Grasett, C. S.	1907
Gibson, M. M.	1910	Grassie, C. A.	1908
Gibson, N. R.	1901	Gray, A. (deceased)	1904
Gibson, W. S.	1904	Gray, A. G.	1913
Gill, E. I.	1914	Gray, A. T.	1897
Gill, J. R.	1914	Gray, A. J.	1913
Gillespie, P.	1903	Gray, E. D.	1915
Gillies, A.	1907	Gray, E. R.	1913
Glass, L. G.	1915	Gray, G. D.	1915
Glover, A. E.	1909	Gray, J.	1906
Goad, V. A. E.	1910	Gray, J.	1915
Goldie, A. R.	1893	Gray, J. E.	1909
Goodall, J. N.	1904	Gray, W. W.	1904
Gooderham, A. E.	1909	Greatrex, W. K.	1917
Gooderham, G. A. (deceased)	1915	Green, R. E.	1911
Gooderham, J. L.	1911	Greene, E. A.	1911
Goodeve, V. S.	1910	Greene, G. E. D.	1909
Goodman, H. M.	1913	Greene, P. W.	1906

Greene, R. L.	1910	Gunn, W. W.	1909
Greene, W. H.	1909	Gurnett, E. G.	1916
Greenwood, W. K.	1904	Gurney, W. C. (deceased)	1896
Grierson, C. I.	1914	Gurofsky, M.	1916
Griffiths, G. E.	1915	Guest, W. S.	1900
Guernsey, F. W.	1895	Guy, E.	1899
Gulley, C. L.	1908		

**H**

Haas, M. S.	1915	Hastings, M. B.	1911
Hackner, J. W.	1908	Haultain, H. E. T.	1889
Hadcock, J. P.	1913	Haviland, F. L.	1908
Hagarty, R. E. W.	1907	Hawes, J. H.	1914
Hagedorn, G. C.	1916	Hawley, H. A.	1913
Hagerman, F. G.	1909	Hay, C. O. (deceased)	1909
Haight, H. V.	1896	Hayes, L. J.	1903
Halford, D. S.	1915	Hayman, L. T.	1914
Hall, H. G.	1911	Hayward, C.	1915
Hall, K.	1907	Hearn, R. L.	1913
Hall, W. H.	1914	Heebner, M. B.	1911
Hall, W. T. (deceased)	1915	Heinonen, H. J.	1913
Hally, G. H.	1914	Helliwell, J. G. (deceased)	1910
Hamer, A. T. E.	1901	Helson, F. I.	1901
Hamilton, J. F.	1903	Hemphill, W.	1900
Hamilton, C. B.	1906	Hemphill, J.	1909
Hamilton, C. T.	1907	Henderson, E. E.	1885
Hamilton, G. M.	1911	Henderson, F. D.	1903
Hancock, C. W.	1918	Henderson, J. F.	1910
Hanes, G. S.	1903	Henderson, S. E. M.	1900
Hanley, S. C.	1893	Henderson, C. D.	1908
Hanlon, J. E.	1915	Hendry, M. C.	1905
Hanmer, G.	1917	Henry, J. A.	1900
Hanna, J. J.	1914	Henry, R. A.	1913
Hanning, G. F.	1889	Henwood, C.	1902
Hara, L. D.	1904	Herald, W. J.	1894
Harcourt, F. Y.	1903	Hermon, E. B.	1886
Harcourt, H. E.	1911	Heron, J. B.	1904
Hare, R. A.	1907	Hertzberg, C. S. L.	1905
Hare, R. M.	1916	Hertzberg, H. F. H.	1907
Hare, W. A.	1899	Hess, J. E.	1919
Harkins, J. M.	1919	Hett, S.	1906
Harkness, A. H.	1895	Hewson, E. G.	1908
Harkness, A. L.	1906	Hewson, W. G.	1905
Harper, C. J.	1909	Hickling, F. G.	1910
Harris, A. B.	1917	Hicks, W. A. B.	1897
Harris, C. J.	1904	Higgins, L. T.	1915
Harris, J. H.	1910	Hill, E. M. M.	1904
Harris, H. C.	1913	Hill, S. N.	1904
Harris, R. W.	1917	Hill, H. O.	1907
Harrison, R. L.	1906	Hill, H. R.	1911
Harrison, F. W.	1905	Hill, T. A.	1913
Harrison, E.	1906	Hillis, C. R. (deceased)	1906
Harron, L. W.	1916	Hinch, E. F.	1910
Hartney, J. C. (deceased)	1906	Hogarth, B. B.	1914
Harvey, C.	1901	Hogarth, C. E.	1915
Harvey, D. W.	1909	Hogarth, G.	1909
Harvie, N. J. (deceased)	1910	Hogg, T. H.	1907
Hastings, C. E.	1916	Hodge, R. T. C.	1916

Holcroft, H. S. (deceased) . . . . .	1900	Huff, A. J. . . . .	1911
Holden, A. J. . . . .	1917	Huffman, K. . . . .	1911
Holden, O. . . . .	1913	Hughes, C. (deceased) . . . . .	1909
Holmes, A. E. . . . .	1909	Hugli, E. E. H. . . . .	1914
Holmes, C. R. . . . .	1909	Hull, H. S. . . . .	1895
Hookway, C. W. . . . .	1906	Hull, A. H. . . . .	1906
Hoover, O. H. . . . .	1910	Hunter, A. E. (deceased) . . . . .	1909
Hopkins, P. E. . . . .	1910	Hunter, A. N. . . . .	1908
Hopkins, R. H. . . . .	1906	Hurlburt, R. W. . . . .	1917
Hopper, G. H. . . . .	1919	Hustwitt, S. A. . . . .	1914
Horton, J. A. . . . .	1903	Hutcheon, J. . . . .	1890
Hoshal, G. C. . . . .	1909	Hucheson, G. F. . . . .	1917
Houston, R. S. . . . .	1906	Hutchings, W. . . . .	1914
Howard, J. T. (deceased) . . . . .	1913	Hutton, C. H. . . . .	1907
Howlett, T. F. . . . .	1913	Hyatt, H. . . . .	1911
Hubbert, S. . . . .	1916	Hyland, H. M. . . . .	1907
Huber, W. . . . .	1906	Hyman, B. . . . .	1918
Huether, D. J. . . . .	1908	Hyman, E. W. . . . .	1907
Huether, A. D. . . . .	1908		

**I**

Iller, S. B. . . . .	1908	Ironside, G. A. . . . .	1915
Ingles, C. J. . . . .	1904	Irvine, J. (deceased) . . . . .	1889
Innes, W. L. . . . .	1890	Irwin, H. . . . .	1909
Ireland, L. G. . . . .	1907	Irwin, W. J. . . . .	1910
Ireland, T. P. . . . .	1915	Isbister, J. . . . .	1909
Ireson, E. T. . . . .	1913		

**J**

Jackes, F. P. (deceased) . . . . .	1909	Johnston, F. E. . . . .	1918
Jackson, C. W. H. . . . .	1915	Johnston, G. W. F. . . . .	1915
Jackson, J. G. . . . .	1903	Johnston, H. . . . .	1903
Jackson, F. C. . . . .	1901	Johnston, H. C. . . . .	1910
Jackson, W. . . . .	1907	Johnston, A. C. . . . .	1894
Jackson, C. B. . . . .	1907	Johnston, D. M. . . . .	1902
Jackson, J. E. . . . .	1909	Johnston, H. A. . . . .	1900
Jackson, K. B. . . . .	1916	Johnston, J. C. . . . .	1900
James, E. W. . . . .	1909	Johnston, J. A. . . . .	1900
James, D. D. . . . .	1889	Johnston, C. K. . . . .	1903
James, E. A. . . . .	1904	Johnston, R. H. . . . .	1910
James, F. L. . . . .	1910	Johnston, W. J. . . . .	1909
James, O. S. . . . .	1891	Johnston, C. . . . .	1906
Jamieson, E. A. . . . .	1910	Johnston, C. E. (deceased) . . . . .	1909
Jannati, A. S. . . . .	1914	Johnston, J. T. . . . .	1908
Jarvis, R. H. (deceased) . . . . .	1911	Johnston, S. H. . . . .	1919
Jefferson, K. A. . . . .	1915	Jones, C. M. . . . .	1915
Jeffrey, C. C. . . . .	1910	Jones, J. E. . . . .	1894
Jeffrey, D. . . . .	1882	Jones, L. E. . . . .	1911
Jepson, W. C. . . . .	1906	Jones, G. S. . . . .	1905
Jermyn, P. V. . . . .	1904	Jones, G. R. . . . .	1906
Job, H. E. . . . .	1894	Jones, R. D. . . . .	1915
Johnson, C. C. . . . .	1890	Jones, T. (deceased) . . . . .	1906
Johnson, R. P. . . . .	1914	Jupp, A. E. . . . .	1906
Johnson, S. M. . . . .	1894	Jupp, E. H. . . . .	1915
Johnson, G. R. . . . .	1913	Junkin, R. L. . . . .	1913

**K**

Kamman, J. I.	1914	Keys, W. R.	1908
Karn, H. C.	1916	Killip, W. C.	1908
Kay, J. (deceased)	1914	Kilmer, C. E.	1913
Kay, E. W.	1907	King, C. F.	1897
Kearns, N.	1919	King, G. F.	1916
Keefe, W. S. H.	1904	King, J. T.	1910
Keefer, N. G.	1914	Kinghorn, A. A.	1907
Keele, J.	1893	Kingstone, G. A.	1910
Keffer, A. H. E.	1909	Kirby, J. R. (deceased)	1916
Keith, J. C.	1910	Kirby, R. W.	1916
Keith, D. F.	1907	Kirkland, W. C. (deceased)	1884
Keith, H. P.	1907	Kirkwood, M.	1911
Kelly, E. A.	1911	Kirn, R. W.	1916
Kelly, S. S.	1913	Kirwan, G. L.	1910
Kemp, J. B. O.	1909	Kirwan, P. T.	1910
Kennedy, J. H.	1882	Klingner, L. W.	1907
Kennedy, H. G.	1908	Klotz, H. N. (deceased)	1909
Keppy, J. D. (deceased)	1906	Knight, R. H.	1902
Kerby, H. S.	1914	Knight, J. A.	1914
Kerr, A. E.	1913	Knight, S.	1910
Kerr, J. A.	1914	Kohl, H.	1915
Kewin, G. E.	1914	Kormann, J. S.	1898
Key, W. R.	1909	Kribs, G.	1905
Keys, C. R.	1915	Krug, S. J.	1916

**L**

Laidlaw, J. T.	1893	Lawrence, G. W.	1915
Laidlaw, R. A.	1901	Lawson, W. L.	1892
Laidlaw, R. E.	1915	Lawrie, R. R. (deceased)	1896
Laing, W. F. (deceased)	1896	Leach, H. O. (deceased)	1915
Laing, A. T.	1892	Leaver, C. B.	1910
Laing, J. S.	1913	Lee, L. A. C.	1916
Laing, P. A.	1905	Lee, R. G.	1910
Laird, R. <i>(deceased)</i>	1886	Lee, W. A. (deceased)	1892
Lamb, F. C.	1907	Leighton, J. W.	1905
Lamb, G. J.	1915	Leitch, J. N. (deceased)	1910
Lamont, A. W.	1909	Lennox, A. E.	1909
Lancaster, H. M.	1906	LePan, A. D.	1907
Lane, A. (deceased)	1891	Leslie, A.	1913
Lang, A. G.	1903	Leslie, J. N. M.	1908
Lang, J. L.	1906	Lesperance, L. J.	1919
Lang, S. A. (deceased)	1914	Lethbridge, W. R.	1911
Langley, C. E.	1892	Levesque, L. (deceased)	1917
Langmuir, F. L.	1902	Lewis, F. C.	1908
Langmuir, C. B.	1909	Lieberman, M.	1911
Lanning, J.	1911	Lillie, G. L.	1911
Larkworthy, W. J. (deceased)	1904	Lindsay, J. H.	1907
Laschinger, E. J.	1892	Lindsay, R. E.	1914
Lash, F. L.	1893	Linton, A. P.	1906
Lash, N. M.	1894	Livingston, H. D. (deceased)	1913
Latham, R.	1899	Lloyd, N. C. A.	1909
Latimer, C. W.	1914	Lloyd, R. H.	1915
Latornell, A. J. (deceased)	1903	Lockhart, W. E. (deceased)	1915
Latornell, A.	1905	Long, A. L.	1911
<i>Lavrock, J. E.</i>	1898	Longstaff, J. C.	1910
Lawler, E. R.	1910	Longworthy, W. E.	1915
Lawless, N. (deceased)	1911	Lorimer, N. H.	1914

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 179

Lott, A. E.	1887	Ludgate, B. A.	1885
Loucks, R. W. E.	1909	Lumbers, W. C.	1901
Loudon, T. R.	1905	Lye, O. G.	1914
Lount, C. T.	1915	Lye, R. G.	1915
Lowrie, A. W. P.	1911	Lynar, H. R.	1908

Mac

Macallum, A. F.	1893	MacKenzie, H. J.	1914
MacAndrews, W. M.	1911	MacKenzie, A. M.	1914
Macaulay, R. V.	1911	MacKenzie, W. D.	1907
MacBain, J. T.	1911	MacKenzie, W. S.	1911
MacBeth, C. (deceased)	1896	Mackinnon, J. A.	1911
MacBeth, R. E. A. (deceased)	1911	Mackinnon, J. G.	1909
Macdonald, A. D.	1910	Mackinnon, W.	1906
Macdonald, C. A.	1915	Mackintosh, D.	1898
Macdonald, C. E.	1918	MacLachlan, K. S.	1913
Macdonald, G. G.	1917	MacLachlan, W.	1906
Macdonald, J. B.	1910	MacLachlan, W. A.	1909
Macdonald, J. A.	1910	MacLaurin, J. G.	1911
Macdonald, G. A.	1910	Maclean, B. A.	1909
Macdonald, F. M.	1911	MacLennan, G. G. (deceased)	1910
Macdonald, R. A.	1916	MacLeod, G.	1907
Macdonald, W. A. (deceased)	1914	MacLeod, D. D. (deceased)	1910
Macdonell, I. M.	1915	MacMillan, G.	1901
Macdougall, A. C.	1901	MacMurchy, J. A.	1896
Macfarlane, E. D.	1909	MacMurchy, H. G.	1910
MacGregor, A. E.	1910	MacNicol, N.	1919
MacIntyre, W. B.	1919	Macpherson, H. E.	1915
MacKay, A. G.	1907	Macpherson, N. W.	1909
MacKay, J. T.	1902	MacPherson, A. R.	1913
MacKay, E. G.	1910	Macpherson, H. N.	1914
MacKendrick, B.	1914	MacQuarrie, A. H.	1914
MacKenzie, H. R.	1913	MacTavish, H. J.	1910
MacKenzie, K. A.	1906	MacTavish, W. H.	1913

Mc

McAllister, J. E.	1891	McCulloch, A. L.	1887
McAllister, A. L.	1893	McCurdy, J. A. D.	1907
McAlpine, D. D.	1909	McDonald, K. D.	1915
McAndrew, J. B.	1911	McDonald, J. P.	1915
McAree, J. (deceased)	1882	McDonald, N. G.	1918
McArthur, R. E.	1900	McDonald, R. C.	1914
McArthur, A. S.	1909	McDougall, J. (deceased)	1884
McAuslan, H. J.	1903	McDougall, S. G.	1910
McBride, A. H.	1902	McDowall, R.	1888
McBride, T. C.	1910	McEachren, J. A.	1911
McCaffrey, W. R.	1915	McElhanney, T. A.	1910
McCandlish, S. G.	1917	McElroy, R. W.	1911
McCarthy, T. V.	1913	McEntee, B.	1892
McClelland, H. L.	1917	McEwen, G. G.	1904
McColl, J. R.	1919	McEwen, H. J.	1911
McCollum, C. R.	1909	McFarlane, J. A.	1903
McConnell, A. W.	1906	McFarlane, W. G.	1904
McConnell, R. S.	1913	McFarlane, J. B.	1907
McCordick, A. S.	1909	McFarlen, G. W.	1888
McCort, C. R.	1915	McFarlen, T. J.	1893
McCrodan, B. A.	1916	McFaul, W. L.	1913
McCuaig, O. B.	1904	McGarry, P. J.	1910
McCuaig, P. J.	1909	McGeorge, W. G.	1908

McGhie, W. G.	1911	McLean, C. A.	1905
McGibbon, C. P.	1904	McLean, W. N.	1905
McGie, W. R.	1915	McLean, L. A. (deceased)	1908
McGill, S. B.	1914	McLeish, A. G.	1911
McGorman, S. E.	1906	McLellan, R. A.	1911
McGowan, J.	1895	McLennan, A. L.	1902
McGregor, W. W. (deceased)	1905	McLeod, E. W.	1918
McGregor, J. M.	1908	McLeod, G.	1909
McGugan, D. F.	1915	McMaster, A. T. C.	1901
McGugan, D. J.	1907	McMaster, W. A. A.	1908
McIlhargey, P. E.	1917	McMillan, J. G.	1900
McIlwraith, D. G.	1906	McMillan, D.	1904
McIntosh, A. H.	1907	McMillan, V.	1909
McIntosh, W. G.	1909	McMordie, H. C.	1908
McIntyre, J. S.	1915	McNab, J. V.	1906
McKague, E. V.	1915	McNaughton, A. L.	1903
McKay, O.	1885	McNaughton, F. W.	1898
McKay, C. (deceased)	1904	McNeill, F. W.	1907
McKay, W. N.	1895	McNiven, J.	1910
McKechnie, F. H.	1909	McPherson, A. J.	1893
McKenzie, D. A.	1911	McPherson, J. A.	1906
McKenzie, D. W.	1905	McPherson, W. B.	1911
McKenzie, J. A.	1906	McQuarrie, M. K.	1907
McKim, L. R.	1910	McQueen, A. A.	1911
McKinnon, H. L.	1895	McRoberts, A. A.	1908
McKnight, J. H.	1909	McSloy, J. I.	1910
McLaren, A. J.	1911	McTaggart, A. L.	1894
McLaren, D. L.	1914	McVean, H. G.	1901

**M**

Mace, F. G.	1905	Martin, J. C.	1911
Madden, J. F. S.	1902	Martin, W. H.	1910
Maddock, C. O.	1918	Martin, T.	1896
Madge, N. G.	1908	Martindale, E. S.	1909
Madill, H. H.	1911	Martyn, O. W.	1909
Main, W. T.	1893	Mason, D. H. C.	1907
Maisonville, A. W. R.	1910	Mathers, A. S.	1917
Malcolm, A. L.	1909	Matheson, W. C.	1901
Malcolmson, W. S.	1907	Mathison, P.	1901
Malone, J. E.	1908	Matthews, R. G.	1914
Manning, N. H.	1909	Matthews, F. J.	1919
Manning, R. C.	1917	Matthews, A. C.	1910
Manson, G. J.	1904	Maus, C. A.	1903
Manson, A. B.	1909	Maxwell, H. W.	1914
Marani, C. J.	1888	Maxwell, W. A.	1906
Marani, V. G.	1893	Maynard, H. V.	1907
Margison, O.	1916	Meader, C. H.	1910
Marlatt, K. D.	1908	Meadows, C. A.	1911
Marr, N.	1910	Meadows, W. W.	1895
Marriott, F. G.	1903	Meahan, P. W.	1914
Marrs, C. H.	1902	Mechin, F. C.	1914
Marrs, D. W.	1906	Meitz, W. H.	1915
Marshall, J. A.	1914	Melson, J. W.	1907
Marshall, J. A. P.	1914	Mendizabal, A. R.	1918
Marshall, R. J.	1908	Mennie, R. S.	1902
Marshall, S. A.	1907	Menzies, J. M.	1906
Martin, E. T.	1915	Merrill, E. B.	1890-1891
Martin, F.	1887	Merriman, H. O.	1910

Middleton, H. T.	1901	Montague, F. F.	1906
Mickle, G. R.	1888	Monteith, E. M.	1915
Mickleborough, K. F.	1913	Montgomery, R. H.	1903
Mickler, G. J.	1913	Moody, F. H.	1908
Mill, F. X. (deceased)	1889	Moore, H. H.	1902
Millar, W. G.	1914	Moore, E. E.	1904
Miller, D. J.	1910	Moore, J. H.	1888
Miller, A. S.	1914	Moore, J. E. A.	1891
Miller, L. Haun	1900	Moore, F. A.	1903
Miller, M. L.	1903	Moore, W. J.	1906
Miller, L. R.	1906	Moore, J. M.	1907
Milligan, G. L.	1908	Moorhouse, W. N.	1904
Milligan, F. S.	1910	Morden, L. W.	1905
Milligan, W. E.	1914	Morgan, J. P.	1910
Millman, N. C.	1913	Morice, J. H.	1908
Mills, F. L.	1915	Morley, P. F.	1907
Mills, G. G.	1907	Morphy, J. A.	1911
Mills, P. E.	1910	Morris, A.	1915
Mills, P. H.	1914	Morris, B. M. (deceased)	1915
Mills, L. G.	1911	Morris, J. L.	1881
Milne, C. G. (deceased).	1892	Morris, C. A.	1909
Mines, W.	1893	Morris, W. D.	1915
Minns, J. B.	1907	Morrison, D.	1914
Minty, W.	1894	Morton, G.	1909
Mitchell, A. B.	1908	Mowbray, F. E. H.	1908
Mitchell, G.	1915	Muir, J. M.	1915
Mitchell, J. S.	1914	Mullins, E. E.	1903
Mitchell, P. H.	1903	Mullins, G. J.	1914
Mitchell, L. C.	1911	Mulqueen, F. J.	1913
Mitchell, C. H.	1892	Munro, A. H.	1910
Mitchell, B. F.	1906	Munro, W. H.	1904
Mitchell, R. C.	1918	Munro, G. R.	1905
Mitchell, W. B.	1916	Munro, F. V.	1909
Moberley, H. K.	1889	Muntz, E. P.	1914
Moffatt, R. W.	1905	Murdie, W. C.	1913
Mogan, J. T.	1915	Murdock, C. R.	1906
Molesworth, G. N.	1907	Murphy, C. J.	1906
Molesworth, J. C. P. (deceased)	1908	Murphy, M. H.	1911
Mollard, W. A.	1919	Murray, E. W.	1907
Monds, W.	1899	Murray, J. D.	1907
Monk, E. D.	1908	Murray, W. P.	1908
Montague, J. R.	1914	Murton, J. C.	1911
		Mutch, D. A. S.	1913

**N**

Nash, J. C.	1901	Newman, W.	1891
Nash, T. S.	1902	Newton, J.	1909
Near, W. P.	1906	Newton, K. L.	1913
Neelands, E. V.	1900	Newton, W. E.	1910
Neelands, E. W.	1907	Ney, C. H.	1916
Neelands, R. E. K.	1907	Nichol, F. T.	1910
Neelands, R.	1906	Nicholson, C. J.	1894
Neilly, B.	1907	Nicholson, C. L.	1914
Neilson, M. A.	1915	Nicholson, J. B.	1914
Neville, E. A.	1909	Nicklin, H. S.	1915
Nevitt, I. H.	1903	Nicklin, W. G.	1905
Newcombe, J. C. (deceased)	1916	Niebel, E. H.	1911
Newhall, V. A.	1910	Nixon, C. K.	1911

Noble, E. S.	1911	Norwich, H. B.	1919
Noecker, C.	1914	Nott, G. E.	1916
Northey, R. K.	1911	Nourse, A. E.	1907

**O**

O'Brien, E. D.	1905	Oliver, C. E.	1916
O'Brien, J. E.	1917	Oliver, E. W.	1903
O'Callaghan, E. A.	1916	Oliver, J. P.	1903
O'Connor, E. B.	1915	Omand, W. M.	1915
Odell, L. S.	1909	O'Neil, C. M.	1910
O'Donnell, V. J.	1909	Orr, J. A.	1911
Offerhaus, W. A. R.	1917	Orr, W. H.	1918
O'Flynn, W. A.	1911	O'Sullivan, J. J.	1907
O'Grady, W. deC.	1908	Otto, C. J.	1913
O'Hearn, J. J.	1909	Owens, J. A.	1914
Oke, W. V.	1911		

**P**

Pace, J. D.	1903	Perry, C. V. (deceased)	1914
Pace, G.	1904	Peterkin, S. M.	1915
Pae, A. W.	1909	Petry, A. M.	1909
Palmer, C. E.	1910	Pettingill, R. E.	1906
Pardoe, W. S.	1904	Phillips, E. H.	1900
Paris, J.	1904	Phillips, H. G.	1908
Park, D. G.	1906	Phillips, C. H.	1910
Park, R. T.	1919	Phillips, E. P. A.	1905
Parke, J.	1904	Phillips, J. J.	1913
Parker, A. H.	1914	Phillips, W. E.	1914
Parker, G. C.	1910	Philp, D. H.	1903
Parker, J. S.	1911	Philp, G. O.	1914
Parkin, J. H.	1911	Philp, W. M.	1909
Parkinson, N. F.	1913	Pick, B. W.	1911
Parr, H. A.	1917	Pickering, A. E.	1904
Parsons, J. L. R.	1901	Pigott, R. B.	1909
Paterson, G. W.	1906	Pinhey, C. H.	1887
Paterson, W. B.	1919	Pinkney, D. H.	1903
Paton, T. K.	1907	Pivnick, M.	1908
Patten, B. B.	1903, 1905	Playfair, N. L.	1892
Patterson, J.	1899	Plunkett, T. H.	1903
Patterson, R. G.	1914	Ponton, G. M.	1909
Patton, J. McD.	1911	Pope, A. S. H.	1899
Paul, R. A.	1915	Porte, E. H.	1911
Paulin, F. W.	1907	Porte, W. B.	1905
Payne, A. N.	1915	Porter, C. F.	1915
Peaker, W. J.	1904	Porter, C. I.	1909
Pearce, K. K.	1910	Porter, J. E.	1915
Pearce, L. P.	1915	Potter, R. B.	1907
Pearson, C. L.	1911	Powell, G. G.	1902
Pearson, G. P.	1918	Powell, N. L.	1916
Peart, J. D.	1914	Powell, W. D.	1915
Peart, J. W.	1913	Power, G. H.	1901
Peck, H. M. (deceased)	1915	Pratt, F. M.	1911
Peckover, H. J.	1908	Prentice, J. M. (deceased)	1892
Pedder, J. R. (deceased)	1890	Price, H. W.	1901
Pennington, C. W.	1914	Pringle, J. E.	1916
Pepler, S. J. (deceased)	1911	Prochnow, F. E.	1907
Pequegnat, M.	1908	Proctor, A. I.	1909
Perrin, W. J. (deceased)	1911	Proctor, E. M.	1908
Perron, E.	1913	Procunier, J. F.	1907
		Proudfoot, H. W. (deceased)	1897

Publow, C. F.	1908	Purdy, W. F. P.	1915
Pullan, H.	1911	Purser, R. C.	1906
Pullen, E. F.	1905	Pye, D. E.	1910

**Q**

Quail, H. C. (deceased)	1913	Quance, G. E.	1907
Quail, J.	1909	Quinlan, L. J.	1911

**R**

Railton, L. W.	1911	Robertson, H. D.	1902
Raine, H.	1907	Robertson, J.	1884
Raley, W. E. (deceased)	1915	Robertson, J. M.	1914
Ramsay, W. S.	1910	Robertson, J. M.	1893
Ramsey, G. L.	1905	Robertson, N. R.	1906
Ramsperger, A. F.	1909	Robertson, A. R.	1908
Rance, C. C.	1915	Robertson, D. F.	1903
Raney, P. H. (deceased)	1914	Robinson, J. K. (deceased)	1891
Rankin, G.	1915	Robinson, F. J. (deceased)	1895
Rannie, J. L.	1907	Robinson, A. H. A.	1897
Ransom, J. T.	1908	Robinson, L. H.	1904
Ratz, E. G.	1913	Robinson, W. A.	1908
Ratz, J. E.	1911	Robinson, R. C.	1908
Ratz, R. D.	1917	Robinson, W. E.	1911
Ratz, W. F. (deceased)	1902	Roblin, H. L.	1911
Raymer, A. R.	1884	Roddick, J. O.	1906
Raymond, D. C.	1904	Rogers, J.	1887
Rayner, G. W.	1905	Rogers, C. H.	1906
Read, F. N. (deceased)	1911	Rogers, L. J.	1908
Redfern, B. J. (deceased)	1910	Rolfson, O.	1906
Redfern, W. B.	1908	Rolph, H.	1894
Redfern, C. R.	1909	Rose, H.	1919
Redman, W. B.	1915	Rose, H. C.	1916
Reid, E. V. (deceased)	1911	Rose, J. T.	1915
Reid, F. B.	1904	Rose, K.	1888
Reid, F. G.	1915	Rose, R. R.	1908
Reid, W. M.	1919	Rosebrugh, T. R.	1889
Relyea, P. J.	1915	Ross, A. C.	1915
Revell, G. E. (deceased)	1899	Ross, J.	1915
Rice, R. H.	1914	Ross, J. A.	1892
Richards, E.	1899	Ross, J. E.	1888
Richardson, A. A.	1915	Ross, D.	1908
Richardson, C. E.	1910	Ross, R. A.	1890
Richardson, C. W. B.	1907	Ross, K. G.	1906
Richardson, F. L.	1908	Ross, R. B. (deceased).	1905
Richardson, G. H.	1888	Ross, R. C.	1906
Richardson, W. A.	1911	Ross, S. R.	1916
Richmond, J.	1916	Ross, S. W.	1916
Ricker, H. A.	1908	Ross, O. W.	1910
Riddell, J. M.	1913	Rothery, L. W.	1911
Riddell, M. R.	1904	Rothwell, T. E.	1905
Ridler, A. A.	1907	Rothwell, H. E.	1907
Ritchie, H. C.	1910	Rothwell, H. D.	1914
Ritchie, J. E.	1913	Rounthwaite, C. H. E.	1900
Roaf, J. R.	1900	Rous, C. C.	1913
Robertson, A. S.	1914	Routly, H. T.	1906
Robertson, A. S.	1915	Rovsky, J.	1918
Robertson, C. S.	1913	Rowe, H. M.	1915
Robertson, F. A.	1908	Rowe, T. L. F.	1911

Roxburgh, G. S.	1904	Rust, H. P.	1901
Rubidge, W. F. B.	1910	Rutherford, F. N.	1904
Runciman, A. S.	1911	Rutherford, F. S.	1914
Russel, W. B.	1891	Rutledge, L. T.	1909
Russel, R.	1893	Rutley, F. G.	1911
Russell, C. H.	1913	Rutter, G. W.	1915
Russell, J. P.	1916	Ryckman, J. H.	1906

**S**

Sagar, W. L.	1918	Sheard, P.	1911
Salter, E. M.	1911	Shearer, H. F.	1908
Samuel, M.	1918	Sheehy, J. S.	1915
Sanders, W. K.	1906	Sheply, J. D.	1904
Sanderson, A. U.	1909	Shepley, J. G. (deceased)	1918
Sara, R. A.	1909	Sheppard, A. C. T.	1907
Sauder, P. M.	1904	Sheppard, H. L.	1914
Sauer, M. V.	1901	Sheppard, N. E. D.	1914
Saunders, G. A.	1899	Sherman, N. C.	1910
Saunders, H. W.	1900	Shields, J. D.	1894
Savage, E. W.	1915	Shier, W. G. (deceased)	1915
Scandrett, F. R.	1911	Shipley, A. E.	1898
Scarlett, A. A.	1913	Shirriff, C. H.	1905
Scheibe, R. R.	1896	Shupe, S.	1914
Scheibe, H. M.	1903	Sibbett, W. A.	1911
Schofield, C. A.	1907	Sievewright, R. L.	1916
Schwenger, C. E.	1909	Sills, C. P.	1911
Scott, A. G.	1915	Silvester, G. E.	1891
Scott, C. A.	1909	Sime, A. W.	1914
Scott, C. R.	1918	Simpson, B. N.	1914
Scott, E. H.	1915	Simpson, C. N.	1915
Scott, G. S.	1905	Sims, F. R.	1913
Scott, J. G. (deceased)	1914	Sinclair, D. (deceased)	1902
Scott, Miss H. E.	1911	Sinclair, D. G.	1913
Scott, J. W.	1911	Sinclair, C. E.	1914
Scott, R. G.	1915	Sinclair, R. B. (deceased)	1915
Scott, W. A. (deceased)	1906	Sisson, C. E.	1905
Scott, W. B.	1916	Skaith, J. B.	1914
Scott, W. F.	1897	Skinner, J. L.	1916
Seaborne, R. L.	1916	Skinner, W. C.	1914
Seaton, N. D.	1911	Slater, F. W.	1904
Secord, A. O.	1908	Smallpiece, F. C.	1898
Sedgwick, A.	1909	Smart, R. S.	1904
Segre, B. H.	1909	Smelser, W. A.	1916
Seibert, F. V.	1909	Smiley, R. W.	1897
Serson, H. V.	1905	Smith, A. N.	1892
Servos, F. M.	1914	Smith, A.	1894
Sewell, L.	1913	Smith, C. A.	1916
Seymour, H. L.	1903	Smith, E. E.	1917
Seymour, N. F.	1915	Smith, H. G. (deceased)	1903
Shanks, T.	1899	Smith, H. M. (deceased)	1914
Sharp, M. C.	1913	Smith, R. W. (deceased)	1898
Sharpe, N.	1911	Smith, J. H.	1903
Shaw, J. H.	1898	Smith, D. A.	1904
Shaw, J. H.	1915	Smith, K. H.	1911
Shaw, K. E.	1913	Smith, M. L. (deceased)	1911
Shaw, W. E. V.	1908	Smith, W. C.	1910
Shaw, M. R.	1909	Smith, G. E.	1910
Shaw, W. C.	1910	Smith, F. L.	1910

Smith, F. R.	1907	Stewart, A. W. J.	1908
Smither, W. J.	1904	Stewart, N. C.	1909
Smithrim, E. R.	1907	Stiles, J. A.	1907
Smithson, E. W.	1917	Stitt, J. B.	1915
Smyth, A. H.	1915	Stiver, J. L.	1907
Smyth, G. M. ( <i>deceased</i> )	1914	St. Lawrence, J.	1908
Snaith, W.	1907	Stock, J. J.	1908
Sneath, R. G.	1911	Stock, P. H.	1909
Snider, A. M.	1917	Stocking, F. T.	1895
Snow, G. B.	1919	Stone, J. D.	1915
Somers, N. L.	1914	Stone, L. I.	1910
Soper, R. W. ( <i>deceased</i> )	1913	Stoneman, E. C. R.	1914
Sparling, M. W.	1909	Storey, G. C.	1915
Speirs, R. M.	1917	Story, R. A.	1911
Speller, F. N.	1893	Strathy, J. M. ( <i>deceased</i> )	1913
Spellman, W. A.	1913	Strathearn, D. K. C.	1919
Spence, J. J.	1909	Street, J. C.	1909
Spencer, A. C.	1907	Strome, I. R.	1914
Spotton, A. K.	1894	Stroud, J. E. C.	1915
Spry, R. J.	1910	Stroud, S.	1909
Squire, G. E.	1911	Stuart, H. B.	1908
Squire, R. H. ( <i>deceased</i> )	1893	Stuart, J. L. G.	1907-1908
Stamford, W. L.	1908	Stubbs, W. F.	1905
Standing, R. O.	1914	Stull, W. W.	1897
Stark, W. H.	1916	Sturdy, N. H.	1905
Starr, R. H.	1908	Suhler, A. N.	1915
Stayner, D. S.	1909	Summers, G. F.	1907
Steel, W. A.	1915	Sureda, J. A.	1916
Steele, I. J.	1902	Sutcliffe, H. W.	1907
Steele, A. L.	1910	Sutherland, A. L.	1910
Steele, W. S. ( <i>deceased</i> )	1911	Sutherland, D.	1913
Stern, E. W.	1884	Sutherland, W. H.	1902
Steven, H. M.	1910	Sutherland, C. C.	1909
Stevenson, W. H.	1901	Swan, A. W.	1917
Stewart, A. E.	1911	Swan, W. G.	1905
Stewart, J. A.	1898	Swan, R. G.	1909
Stewart, D. L. N.	1905	Swinnerton, A. A.	1919
Stewart, M. A.	1905	Sword, A. D.	1908-1909
Stewart, R. B.	1909	Sykes, F. H.	1905
Stewart, R. O.	1911	Symmes, H. D.	1891
Stewart, W. M.	1906	Szammers, C. F.	1911
Stewart, G. S.	1907		

**T**

Tackaberry, S. G.	1914	Temple, J. B.	1911
Tasker, R.	1913	Tennant, D. C.	1899
Tate, H. W.	1909	Tennant, W. C. ( <i>deceased</i> )	1900
Taylor, A.	1900	Tennent, E. H.	1914
Taylor, A. N.	1915	Tennyson, A. L.	1919
Taylor, J. W. R.	1908	Ternan, E. A.	1910
Taylor, J. S. ( <i>deceased</i> )	1914	Thom, W. H.	1910
Taylor, R.	1911	Thomas, A. M.	1919
Taylor, T.	1902	Thomas, G. C.	1911
Taylor, W. E.	1908	Thomas, V. C.	1908
Taylor, W. V.	1893	Thompson, J. M.	1913
Teasdale, C. M.	1902	Thompson, P. M.	1907
Temes, C. N.	1914	Thompson, E. A.	1909

Thompson, H. B.	1910	Torrance, R. D.	1911
Thompson, R. M. A.	1910	Torrance, T. E.	1913
Thompson, W. K.	1913	Tough, W. G. (deceased)	1911
Thomson, A. P.	1917	Townsend, C. J.	1904
Thomson, D. J.	1913	Townsend, D. T.	1904
Thomson, T. K.	1886	Traill, J. J.	1905
Thomson, R. W.	1892	Treadgold, W. M.	1905
Thomson, S. E.	1904	Trees, S. L.	1903
Thomson, L. R.	1905-1907	Trees, A. G.	1909
Thomson, J. E.	1906	Treloar, G. E.	1914
Thomson, O. R.	1907	Tremaine, R. C. C. (deceased)	1895
Thorne, S. M.	1900	Tremayne, J. E.	1916
Thornley, J. H.	1908	Trimble, A. V.	1904
Thorold, F. W.	1900	Trow, R. M.	1913
Tillson, L. B.	1915	Tucker, B. B.	1904
Tillson, E. D.	1905	Tufford, A. A.	1917
Tillson, G. D.	1915	Tull, W. S.	1914
Tilston, C. E.	1917	Turnbull, W. G.	1909
Tilston, J. A.	1914	Turner, W. E.	1905
Tipper, G. A.	1909	Tuttle, H. A.	1917
Titus, C. G.	1910	Twidale, E. A. (deceased)	1914
Titus, O. W.	1917	Tye, H. W.	1908
Tom, J. A.	1915	Tyrrell, E. J.	1917
Tomlinson, B. C.	1917	Tyrrell, J. W.	1883
Toms, C. G.	1908	Tyrrell, H. G.	1886
Topping, V.	1917		

**U**

Uffelmann, W.	1915	Ure, W. G.	1913
Umbach, J. E.	1903	Uren, A. E.	1905
Underwood, J. E.	1909		

**V**

Van Allen, K. M. (deceased)	1910	Venney, L. T.	1910
VanDyke, F. T.	1914	Vercoe, H. L.	1898
VanEvery, W. W.	1899	Verity, M. F.	1914
VanNorman, C. P.	1908-1909	Vickers, N. (deceased)	1911
VanNostrand, J.	1909	Vickery, C. L. (deceased)	1906
Vatcher, A.	1909	Villeneuve, T. L.	1908
Vaughan, J. M.	1905	Von Gunten, C. F.	1913

**W**

Waddell, H. O.	1914	Wanless, A. A.	1902
Wade, E.	1904	Ward, A. L.	1915
Wagner, H. W.	1914	Ward, F. W.	1916
Wagner, N.	1910	Ward, R. C.	1916
Wagner, W. E.	1899	Wardell, A.	1911
Wagner, H. L.	1905	Warrington, G. A.	1910
Waite, J. H. C.	1911	Wass, S. B.	1903
Walcott, W. D.	1911	Watson, F. E.	1911
Waldron, J.	1903	Watson, H. R.	1917
Walker, E. W. (deceased)	1904	Watson, M. B.	1910
Walker, R. M.	1910	Watson, R. B. (deceased)	1893
Walker, W. J.	1907	Watson, J. P.	1904
Walker, J. A.	1908	Watt, G. H.	1899
Walker, C. M.	1909	Watts, R. E. (deceased)	1913
Wallace, G. L.	1911	Waugh, B.	1908
Wallace, H. D. M. (deceased)	1914	Webb, C. E.	1909
Walton, T. (deceased)	1910	Webb, E. E.	1909

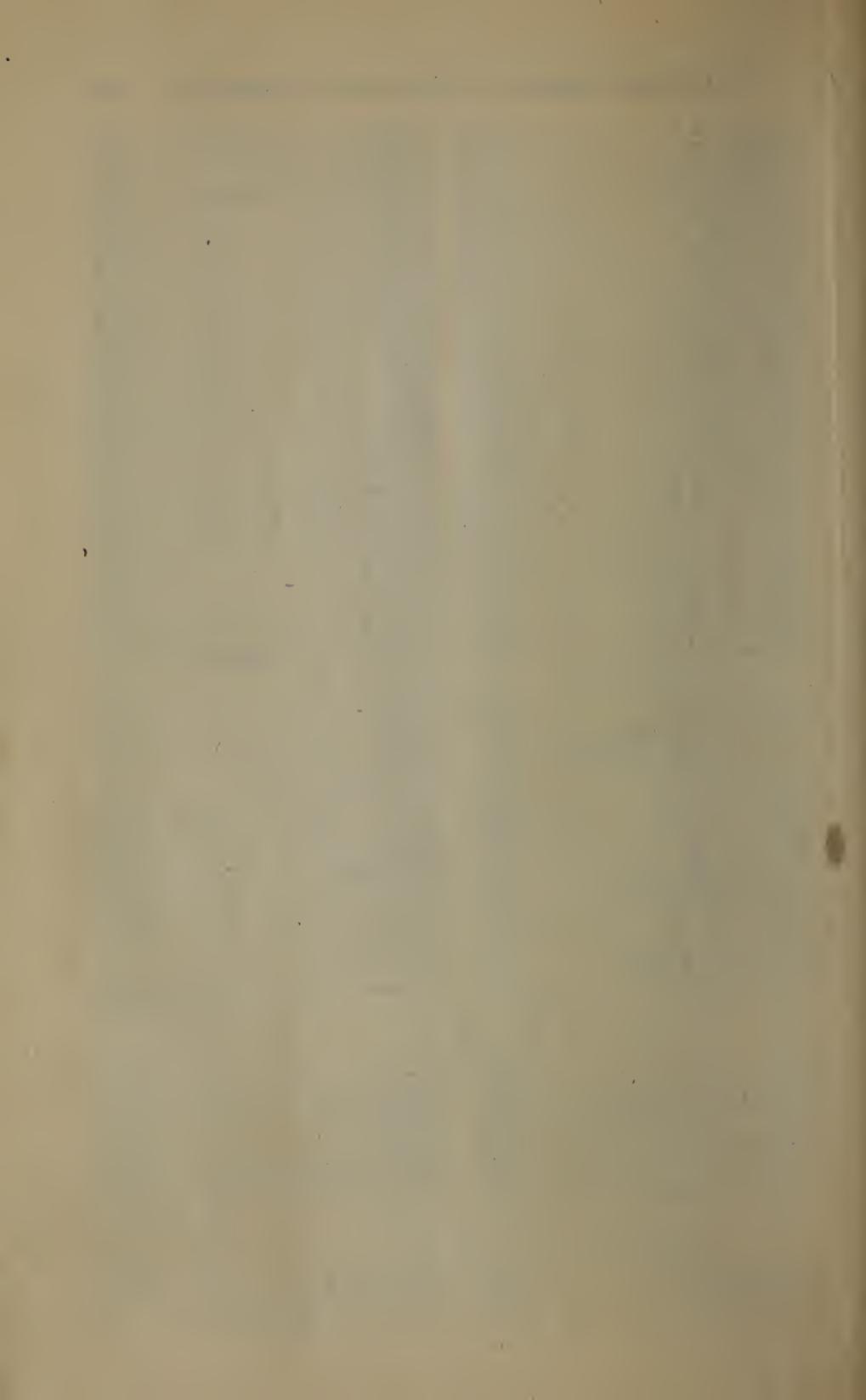
Webster, C. A.	1913	Williams, G. K. (deceased)	1910
Webster, H.	1913	Williamson, O. T. G.	1909
Wedlake, R. M.	1908	Williamson, D. A.	1898
Weeks, M. B.	1897	Willson, R. D. (deceased)	1901
Weir, D. H.	1913	Wilson, A. C.	1914
Weir, F. E.	1915	Wilson, A. F.	1907
Weir, H. M.	1900	Wilson, F. D.	1908
Weir, J. M.	1904	Wilson, F. F.	1909
Weir, R. P.	1908	Wilson, H. A.	1911
Weldon, E. A.	1897	Wilson, H. P.	1914
Welford, P. G.	1911	Wilson, J. C.	1915
Wells, A. F.	1904	Wilson, J. N.	1906
Wells, A. R.	1916	Wilson, J. M.	1908
Weppler, H. S.	1916	Wilson, L. R.	1909
West, A. M.	1908	Wilson, N. D.	1903
West, C. W.	1915	Wilson, W. H.	1910
Wheler, A. G.	1911	Wing, D. O.	1908
Whelihan, J. A.	1903	Winters, W. S.	1913
White, A. H. V.	1892	Withrow, W. J. (deceased)	1890
White, F.	1903	Withrow, F. D.	1900
White, W. R.	1908	Wood, C. S.	1911
White, W. J.	1908	Wood, E. M.	1906
White, F. C.	1909	Wood, G.	1917
White, H. M.	1910	Wood, H. A.	1915
Whitelaw, A. R.	1909	Wood, R. F. B.	1913
Whitley, P. L.	1914	Woodley, G. E. (deceased)	1910
Whitside, J. L. (deceased)	1910	Woods, M. H.	1907
Wickens, W. S.	1910	Wookey, S. A.	1909
Wickett, T.	1889	Woonton, W. G.	1918
Wickett, W. E. (deceased)	1906	Worden, W. G.	1911
Widdicombe, A. E. (deceased)	1916	Workman, G. R.	1910
Wiggins, T. H.	1890	Worthington, W. R.	1904
Wigle, A. E.	1914	Wright, A. J.	1913
Wigle, J. A. H.	1914	Wright, C. H. C.	1888
Wilkes, E. D.	1907	Wright, G. W. A.	1907
Wilkes, G. H.	1911	Wright, L. A.	1910
Wilkinson, T. A.	1898	Wright, R. T.	1894
Wilkinson, R. G.	1909	Wright, W. F.	1904
Williams, C. G.	1903	Wright, W. J. T.	1911
Williams, E. R.	1911	Wrong, F. H.	1911
Williams, J. A. McK.	1909	Wylie, W. H.	1911
Williams, J. N.	1915	Wyman, H. K.	1911-1915

**Y**

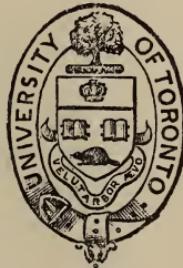
Yeates, E.	1899	Young, R.	1908
Yorke, L. P.	1911	Young, R. B.	1913
Youell, A. W. (deceased)	1910	Young, R. W.	1914
Young, A.	1911	Young, S.	1911
Young, C. R.	1903	Young, W. S.	1910
Young, J.	1907	Young, W. H.	1905

**Z**

Zahn, H. J.	1902	Zinkan, W. E.	1911
Zimmer, A. R.	1907		



THE  
**CALENDAR**  
OF THE  
**University of Toronto**



FACULTY OF  
**APPLIED SCIENCE AND ENGINEERING**  
**1921-1922**

UNIVERSITY OF TORONTO PRESS



## CONTENTS.

	PAGE
CALENDAR.....	5
FACULTY LISTS.....	7
HISTORICAL SKETCH.....	13
GRADUATING DEPARTMENTS.....	14
PROFESSIONAL DEGREES.....	14, 76
MASTER OF APPLIED SCIENCE DEGREE.....	75
JUNIOR INSTRUCTORSHIPS.....	14
MATRICULATION.....	15
ADMISSION AND REGISTRATION.....	16
TUITION FEES, DEPOSITS, ETC.....	16, 17
INFORMATION FOR STUDENTS.....	18
DEPARTMENT OF CIVIL ENGINEERING.....	24
"        MINING ENGINEERING.....	27
"        MECHANICAL ENGINEERING.....	29
"        ARCHITECTURE.....	32
"        CHEMICAL ENGINEERING.....	35
"        ELECTRICAL ENGINEERING.....	37
"        METALLURGICAL ENGINEERING.....	39
OUTLINE OF COURSES OF INSTRUCTION.....	41
LABORATORY EQUIPMENTS.....	77
SCHOOL OF ENGINEERING RESEARCH.....	88
LIBRARY.....	89
ROYAL ONTARIO MUSEUM.....	89
ENGINEERING SOCIETY.....	91
STUDENT SOCIETIES.....	92
LODGING AND BOARD, RESIDENCES.....	98
STUDENTS IN ATTENDANCE.....	101
GRADUATES.....	110
INDEX TO GRADUATES.....	178

1921

## CALENDAR

1921

JANUARY					FEBRUARY					MARCH					APRIL									
Sun.	. 2	9	16	23	30	Sun.	. .	6	13	20	27	Sun.	. .	6	13	20	27	Sun.	. .	3	10	17	24	..
Mon.	. 3	10	17	24	31	Mon.	. .	7	14	21	28	Mon.	. .	7	14	21	28	Mon.	. .	4	11	18	25	..
Tues.	. 4	11	18	25	..	Tues.	. 1	8	15	22	..	Tues.	. 1	8	15	22	29	Tues.	. 5	12	19	26	..	
Wed.	. 5	12	19	26	..	Wed.	. 2	9	16	23	..	Wed.	. 2	9	16	23	30	Wed.	. 6	13	20	27	..	
Thur.	. 6	13	20	27	..	Thur.	. 3	10	17	24	..	Thur.	. 3	10	17	24	31	Thur.	. 7	14	21	28	..	
Fri.	. 7	14	21	28	..	Fri.	. 4	11	18	25	..	Fri.	. 4	11	18	25	..	Fri.	. 1	8	15	22	29	
Sat.	. 8	15	22	29	..	Sat.	. 5	12	19	26	..	Sat.	. 5	12	19	26	..	Sat.	. 2	9	16	23	30	
MAY					JUNE					JULY					AUGUST									
Sun.	. 1	8	15	22	29	Sun.	. .	5	12	19	26	Sun.	. 3	10	17	24	31	Sun.	. .	7	14	21	28	..
Mon.	. 2	9	16	23	30	Mon.	. .	6	13	20	27	Mon.	. .	4	11	18	25	Mon.	. .	1	8	15	22	29
Tues.	. 3	10	17	24	31	Tues.	. .	7	14	21	28	Tues.	. .	5	12	19	26	Tues.	. .	2	9	16	23	30
Wed.	. 4	11	18	25	..	Wed.	. 1	8	15	22	..	Wed.	. 6	13	20	27	..	Wed.	. .	3	10	17	24	31
Thur.	. 5	12	19	26	..	Thur.	. 2	9	16	23	30	Thur.	. 7	14	21	28	..	Thur.	. 4	11	18	25	..	
Fri.	. 6	13	20	27	..	Fri.	. 3	10	17	24	..	Fri.	. 1	8	15	22	29	Fri.	. .	5	12	19	26	..
Sat.	. 7	14	21	28	..	Sat.	. 4	11	18	25	..	Sat.	. 2	9	16	23	30	Sat.	. .	6	13	20	27	..
SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER									
Sun.	. 4	11	18	25	Sun.	. 2	9	16	23	30	Sun.	. .	6	13	20	27	Sun.	. .	4	11	18	25	..	
Mon.	. 5	12	19	26	Mon.	. 3	10	17	24	31	Mon.	. .	7	14	21	28	Mon.	. .	5	12	19	26	..	
Tues.	. 6	13	20	27	Tues.	. 4	11	18	25	..	Tues.	. 1	8	15	22	29	Tues.	. .	6	13	20	27	..	
Wed.	. 7	14	21	28	Wed.	. 5	12	19	26	..	Wed.	. 2	9	16	23	30	Wed.	. .	7	14	21	28	..	
Thur.	. 8	15	22	29	Thur.	. 6	13	20	27	..	Thur.	. 3	10	17	24	..	Thur.	. .	8	15	22	29	..	
Fri.	. 2	9	16	23	30	Fri.	. 7	14	21	28	..	Fri.	. 4	11	18	25	..	Fri.	. .	2	9	16	23	30
Sat.	. 3	10	17	24	..	Sat.	. 1	8	15	22	29	Sat.	. 5	12	19	26	..	Sat.	. .	3	10	17	24	31

1922

## CALENDAR

1922

JANUARY					FEBRUARY					MARCH					APRIL										
Sun.	. 1	8	15	22	29	Sun.	. .	5	12	19	26	Sun.	. .	5	12	19	26	Sun.	. .	2	9	16	23	30	
Mon.	. 2	9	16	23	30	Mon.	. .	6	13	20	27	Mon.	. .	6	13	20	27	Mon.	. .	3	10	17	24	..	
Tues.	. 3	10	17	24	31	Tues.	. .	7	14	21	28	Tues.	. .	7	14	21	28	Tues.	. .	4	11	18	25	..	
Wed.	. 4	11	18	25	..	Wed.	. 1	8	15	22	..	Wed.	. 1	8	15	22	29	Wed.	. .	5	12	19	26	..	
Thur.	. 5	12	19	26	..	Thur.	. 2	9	16	23	..	Thur.	. 2	9	16	23	30	Thur.	. .	6	13	20	27	..	
Fri.	. 6	13	20	27	..	Fri.	. 3	10	17	24	..	Fri.	. 3	10	17	24	31	Fri.	. .	7	14	21	28	..	
Sat.	. 7	14	21	28	..	Sat.	. 4	11	18	25	..	Sat.	. 4	11	18	25	..	Sat.	. .	1	8	15	22	29	
MAY					JUNE					JULY					AUGUST										
Sun.	. 7	14	21	28	Sun.	. .	4	11	18	25	Sun.	. 2	9	16	23	30	Sun.	. .	6	13	20	27	..		
Mon.	. 8	15	22	29	Mon.	. .	5	12	19	26	Mon.	. 3	10	17	24	31	Mon.	. .	7	14	21	28	..		
Tues.	. 2	9	16	23	30	Tues.	. .	6	13	20	27	Tues.	. .	4	11	18	25	Tues.	. .	1	8	15	22	29	
Wed.	. 3	10	17	24	31	Wed.	. .	7	14	21	28	Wed.	. .	5	12	19	26	Wed.	. .	2	9	16	23	30	
Thur.	. 4	11	18	25	..	Thur.	. 1	8	15	22	29	Thur.	. 6	13	20	27	..	Thur.	. .	3	10	17	24	31	
Fri.	. 5	12	19	26	..	Fri.	. .	2	9	16	23	30	Fri.	. .	7	14	21	28	Fri.	. .	4	11	18	25	..
Sat.	. 6	13	20	27	..	Sat.	. 3	10	17	24	..	Sat.	. 1	8	15	22	29	Sat.	. .	5	12	19	26	..	
SEPTEMBER					OCTOBER					NOVEMBER					DECEMBER										
Sun.	. 3	10	17	24	Sun.	. .	1	8	15	22	Sun.	. .	5	12	19	26	Sun.	. .	3	10	17	24	31		
Mon.	. 4	11	18	25	Mon.	. .	2	9	16	23	30	Mon.	. .	6	13	20	27	Mon.	. .	4	11	18	25	..	
Tues.	. 5	12	19	26	Tues.	. .	3	10	17	24	31	Tues.	. .	7	14	21	28	Tues.	. .	5	12	19	26	..	
Wed.	. 6	13	20	27	Wed.	. .	4	11	18	25	..	Wed.	. .	1	8	15	22	29	Wed.	. .	6	13	20	27	..
Thur.	. 7	14	21	28	Thur.	. .	5	12	19	26	..	Thur.	. .	2	9	16	23	30	Thur.	. .	7	14	21	28	..
Fri.	. 8	15	22	29	Fri.	. .	6	13	20	27	..	Fri.	. .	3	10	17	24	..	Fri.	. .	4	11	18	25	..
Sat.	. 9	16	23	30	Sat.	. .	7	14	21	28	..	Sat.	. .	4	11	18	25	..	Sat.	. .	2	9	16	23	30

## CALENDAR 1921-1922.

- 1921—Aug. 20 Saturday.....Students Third Year, Dept. 1, report at Gull Lake Camp.  
Sept. 3 Saturday.....Student Third Year, Dept. 2, report at Gull Lake Camp.  
Sept. 15 Thursday.....Last day for receiving applications for supplemental examinations.  
Sept. 23 Friday.....Supplemental examinations begin.  
Sept. 26 Monday.....Meeting of Faculty Council.  
Enrolment.  
Sept. 27 Tuesday.....Academic year begins at 9 a.m.  
Opening address by the President to students of all Faculties at 3 p.m. in Convocation Hall.  
Last day for receiving vacation work.  
Oct. 7 Friday.....Meeting of Faculty Council.  
Oct. 8 Saturday.....Stated meeting of the Caput to deal with requests as to social functions.  
Oct. 12 Wednesday....Meeting of Engineering Society.  
Oct. 14 Friday.....Meeting of Senate.  
Oct. 26 Wednesday....Meeting of Engineering Society.  
Nov. 4 Friday.....Meeting of Faculty Council.  
Nov. 9 Wednesday....Meeting of Engineering Society.  
Nov. 11 Friday.....Meeting of Senate.  
Nov. 23 Wednesday....Meeting of Engineering Society.  
Dec. 2 Friday.....Meeting of Faculty Council.  
Dec. 7 Wednesday....Meeting of Engineering Society.  
Dec. 9 Friday.....Meeting of Senate.  
Dec. 16 Friday.....First Term ends at 12 noon.

- 1922—Jan. 3 Tuesday.....Second Term begins.  
Last day for receiving Theses for B.A.Sc.  
Jan. 4 Wednesday....Assemblage of students of all Faculties in Convocation Hall, 12.10 p.m.  
Jan. 6 Friday.....Meeting of Faculty Council.  
Jan. 11 Wednesday....Meeting of Engineering Society.  
Jan. 13 Friday.....Meeting of Senate.  
Jan. 25 Wednesday....Meeting of Engineering Society.  
Feb. 3 Friday.....Meeting of Faculty Council.  
Feb. 8 Wednesday....Meeting of Engineering Society.  
Feb. 10 Friday.....Meeting of Senate.  
Feb. 22 Wednesday....Meeting of Engineering Society.  
Mar. 3 Friday.....Meeting of Faculty Council.  
Mar. 8 Wednesday....Meeting of Engineering Society.  
Mar. 10 Friday.....Meeting of Senate.  
Annual elections of Engineering Society.

Mar. 22 Wednesday.....Annual meeting of Engineering Society.  
Apr. 4 Tuesday.....Second Term ends.  
Apr. 7 Friday.....Meeting of Faculty Council.  
Apr. 8 Saturday.....Annual Examinations begin.  
Apr. 14 Friday.....Good Friday—Buildings Closed.  
Apr. 21 Friday.....Meeting of Senate.  
May 5 Friday.....Meeting of Faculty Council.  
May 12 Friday.....Meeting of Senate.  
June 7 Wednesday.....Meeting of Senate.  
June 9 Friday.....Annual Commencement.

# University of Toronto

## FACULTY OF APPLIED SCIENCE AND ENGINEERING.

President.....SIR ROBERT A. FALCONER, K.C.M.G., LL.D., D.Litt.  
Dean of Faculty...BRIG.-GENERAL C. H. MITCHELL, C.B., C.M.G.,

D.S.O., C.E., LL.D.

Secretary of Faculty.....A. T. LAING, B.A.Sc.

Bursar.....F. A. MOURÉ, Esq.

G. R. ANDERSON, M.A.	72 Isabella St.
<i>Associate Professor of Physics.</i>	
R. W. ANGUS, B.A.Sc., Mem. Am. Soc. M.E.	42 Howland Ave.
<i>Professor of Mechanical Engineering.</i>	
E. G. R. ARDAGH, B.A.Sc.,	Dovercourt Apartment
<i>Associate Professor of Chemical Engineering.</i>	
J. W. BAIN, B.A.Sc., F.I.C.,	393 Brunswick Ave.
<i>Professor of Chemical Engineering.</i>	
ADRIAN BERRINGTON,	University of Toronto
<i>Associate Professor of Architecture.</i>	
M. C. BOSWELL, M.A., Ph.D.,	University of Toronto
<i>Associate Professor of Organic Chemistry.</i>	
J. R. COCKBURN, M.C., B.A.Sc., M.E.I.C.,	100 Walmer Rd.
<i>Associate Professor of Descriptive Geometry.</i>	
S. R. CRERAR, B.A.Sc., D.L.S.,	122 Grenadier Rd.
<i>Assistant Professor of Surveying.</i>	
F. C. DYER, B.A.Sc.,	233 Ashworth Ave.
<i>Assistant Professor of Mining Engineering.</i>	
P. GILLESPIE, M.Sc., C.E., M.E.I.C.,	358 Davenport Rd.
<i>Professor of Civil Engineering.</i>	
G. A. GUESS, M.A.,	142 Spadina Rd.
<i>Professor of Metallurgy.</i>	
H. E. T. HAULTAIN, C.E., M.I.M.M.,	50 St. George St.
<i>Professor of Mining Engineering.</i>	
A. T. LAING, B.A.Sc.,	146 Balmoral Ave.
<i>Assistant Professor of Applied Mechanics.</i>	
T. R. LOUDON, B.A.Sc., M.E.I.C.,	189 Sheldrake Blvd.
<i>Associate Professor of Applied Mechanics.</i>	
A. WELLESLEY McCONNELL, B.A.Sc.,	36 Prince Arthur Ave.
<i>Associate Professor of Architecture.</i>	
J. McGOWAN, B.A., B.A.Sc.,	Electrical Building
<i>Professor of Applied Mechanics.</i>	
J. H. PARKIN, B.A.Sc., M.E., Assoc. M.A.S., M.E.,	10 Columbine Ave.
<i>Assistant Professor of Mechanical Engineering</i>	

H. W. PRICE, B.A.Sc., <i>Professor of Electrical Engineering.</i>	474 Palmerston Ave.
T. R. ROSEBRUGH, M.A., <i>Professor of Electrical Engineering.</i>	92 Walmer Rd.
L. B. STEWART, O.L.S., D.T.S., <i>Professor of Surveying and Geodesy.</i>	161 Admiral Rd.
W. M. TREADGOLD, B.A., <i>Associate Professor of Surveying.</i>	13 Woodlawn Ave. E.
C. H. C. WRIGHT, B.A.Sc., Registered Architect <i>Professor of Architecture.</i>	419 Markham St.
C. R. YOUNG, B.A.Sc., C.E., M.E.I.C. <i>Associate Professor of Structural Engineering.</i>	98 Hilton Ave.

### Sessional Appointments.

C. S. ADAMS, B.Sc., M.A. <i>Lecturer in Chemistry.</i>	C. & M. Building, U. of T.
W. AUSTIN, M.Sc., <i>Lecturer in Metallurgy.</i>	C. & M. Building, U. of T.
L. M. C. BALDWIN, B.A.Sc. <i>Demonstrator in Drawing.</i>	9 Humewood Ave.
J. L. BANKS, <i>Lecturer in Modelling.</i>	178 Kingston Rd.
E. W. BANTING, B.A.Sc., <i>Lecturer in Surveying.</i>	101 Farnham Ave.
S. G. BENNETT, M.C., B.A.Sc., <i>Lecturer in Commercial Engineering.</i>	16 Howland Ave.
H. S. BROWN, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	Lansing, Ont.
S. K. CHENEY, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	127 Givens St.
J. H. CURZON, <i>Demonstrator in Drawing.</i>	96 Queensbury Ave., Birchcliffe
A. R. CLUTE, B.A., LL.B., <i>Lecturer in Commercial Law.</i>	47 Elgin Ave.
W. A. DANCEY, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	23 Surrey Place
N. P. F. DEATH, B.A.Sc., <i>Special Lecturer in Mechanical Engineering.</i>	224 Pearson Ave.
W. B. DUNBAR, B.A.Sc., <i>Demonstrator in Drawing.</i>	26 Ozark Crescent
H. K. DUTCHER, B.Sc., Elect. B.Sc. Civil, McGill,	534 St. Clair Ave., W.
<i>Special Instructor in Hydraulics.</i>	
W. R. FETZER, M.A., <i>Demonstrator in Electrochemistry.</i>	120 Brunswick Ave.

FACULTY OF APPLIED SCIENCE AND ENGINEERING 9

H. J. FRANKLIN, B.A.Sc., <i>Demonstrator in Drawing.</i>	72 Deleware Ave.
T. S. GRAHAM, B.A.Sc., <i>Demonstrator in Drawing.</i>	139 Colbeck St.
E. R. GRANGE, D.S.C., B.A.Sc., <i>Demonstrator in Drawing.</i>	34 Chicora Ave.
W. F. GREEN, <i>Demonstrator in Mining.</i>	717 Dovercourt Road
W. S. GUEST, B.A.Sc., <i>Lecturer in Electrical Engineering.</i>	30 McMaster Ave.
R. C. HARDIE, B.A.Sc., <i>Demonstrator in Thermodynamics.</i>	69 Walmer Rd.
C. E. HASTINGS, B.A.Sc., <i>Demonstrator in Drawing.</i>	252 Russell Hill Rd.
U. C. HOLLAND, B.A.Sc., <i>Instructor in Machine Design.</i>	93 Pacific Ave.
R. D. HUESTIS, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	54 Huntley St.
C. A. HUGHES, B.A.Sc., <i>Demonstrator in Applied Mechanics.</i>	Mimico Beach, Ont.
K. B. JACKSON, B.A.Sc., <i>Instructor in Engineering Physics and Photography.</i>	34 Grosvenor St.
C. W. JEFFERY, A.R.C.A., Mem. O.S.A., <i>Lecturer in Freehand Drawing.</i>	York Mills
J. KELLEHER, B.A.Sc., <i>Demonstrator in Electrochemistry.</i>	67 Breadalbane
J. T. KING, B.A.Sc., <i>Lecturer in Mining Engineering.</i>	87 Pine Crest Rd.
MISS J. C. LAING, B.A., <i>Instructor in French.</i>	39 MacFarland Ave.
N. G. McDONALD, B.A.Sc., <i>Demonstrator in Hydraulics.</i>	16 Maitland St.
G. G. MACDONALD, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	88 Indian Grove
H. H. MADILL, B.A.Sc., Registered Architect, <i>Lecturer in Architecture.</i>	88 Woodlawn Ave. W.
J. W. MELSON, B.A.Sc., <i>Lecturer in Surveying.</i>	69 Walmsley Blvd.
W. T. NICHOL, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	544 Church St.
W. H. ORR, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	442 Gladstone Ave.
J. T. RANSOM, B.A.Sc., D. & O.L.S. <i>Demonstrator in Physics.</i>	47 Braemore Gardens
O. ROLFSON, M.A.Sc., D. & O.L.S., <i>Demonstrator in Chemical Engineering.</i>	342 Brunswick Ave.

10 UNIVERSITY OF TORONTO CALENDAR 1921-1922

W. L. SAGAR, B.A.Sc., <i>Fellow in Applied Mechanics.</i>	306 Jarvis St.
W. A. SIBBETT, B.A.Sc., <i>Demonstrator in Drawing.</i>	56 Lyall Ave.
H. C. SOEHNER, B.A.Sc., <i>Demonstrator in Chemistry.</i>	666 Spadina Ave.
W. J. SMITHER, B.A.Sc., A.M.E.I.C., <i>Lecturer in Structural Engineering.</i>	Pensax Court
A. L. STEWART, B.A.Sc. <i>Demonstrator in Thermodynamics.</i>	587 Palmerston Ave.
A. L. TENNYSON, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	16 Maitland St.
V. THOMSON, <i>Demonstrator in Chemistry.</i>	66 Shuter St.
J. E. TOOMER, B.Sc., <i>Lecturer in Metallurgy.</i>	164 Howard Park Ave.
H. A. TUTTLE, B.A.Sc., <i>Instructor in Thermodynamics.</i>	104 Hazelton Ave.
J. J. WEICKER, B.A.Sc., <i>Demonstrator in Hydraulics.</i>	33 Tennis Cresc.
A. C. WILSON, B.A.Sc., <i>Demonstrator in Drawing.</i>	283 Evelyn Ave.
G. R. WORKMAN, <i>Demonstrator in Drawing.</i>	22 Helena Ave.
W. J. T. WRIGHT, M.B.E., B.A.Sc., <i>Lecturer in Drawing.</i>	419 Markham St.
A. R. ZIMMER, B.A.Sc., <i>Lecturer in Electrical Engineering.</i>	80 Pine Crest Rd.

**MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION TO STUDENTS IN APPLIED SCIENCE.**

F. B. ALLAN, M.A., Ph.D., <i>Professor of Organic Chemistry.</i>	380 Brunswick Ave.
S. BEATTY, Ph.D., <i>Assistant Professor of Mathematics.</i>	76 Pinewood Rd.
B. A. BENSLEY, B.A., Ph.D., <i>Professor of Zoology.</i>	37 Admiral Rd.
J. T. BURT-GERRANS, M.A., Phm.B., <i>Assistant Professor of Electrochemistry.</i>	46 Dewson St.
C. A. CHANT, M.A., Ph.D., <i>Professor of Astro-Physics.</i>	201 Madison Ave.
W. A. CLEMENS, M.A., Ph.D., <i>Assistant Professor of Elementary Biology.</i>	307 Dupont St.
A. P. COLEMAN, M.A., Ph.D., F.R.S., <i>Professor of Geology.</i>	476 Huron St.
A. T. DELURY, M.A., <i>Professor of Mathematics.</i>	University of Toronto
B. FAIRLEY, M.A., Ph.D., <i>Associate Professor of German.</i>	22 Kendal Ave.
J. H. FAULL, B.A., Ph.D., <i>Professor of Botany.</i>	102 Yorkville Ave.
J. G. FITZGERALD, M.B., <i>Professor of Hygiene.</i>	186 Balmoral Ave.
G. E. JACKSON, B.A., <i>Assistant Professor of Political Economy.</i>	Hart House, U. of T.
F. B. KENRICK, M.A., Ph.D., <i>Professor of Chemistry.</i>	77 Lonsdale Road.
W. J. LOUDON, B.A., <i>Professor of Mechanics.</i>	Cooksville, Ont.
M. A. MACKENZIE, M.A., F.I.A., <i>Professor of Mathematics.</i>	1 Bellwoods Park
A. MACLEAN, B.A., <i>Assistant Professor of Geology.</i>	60 College St.
W. L. MILLER, B.A., Ph.D., <i>Professor of Physical Chemistry.</i>	50 St. Albans St.
G. H. NEEDLER, B.A., Ph.D., <i>Professor of German.</i>	103 Bedford Rd.
W. A. PARKS, B.A., Ph.D., <i>Professor of Palaeontology.</i>	69 Albany Ave.
A. L. PARSONS, B.A., <i>Associate Professor of Mineralogy.</i>	47 St. Vincent St.
I. R. POUNDER, M.A., <i>Assistant Professor of Mathematics.</i>	46 Tranby Ave.

## 12 UNIVERSITY OF TORONTO CALENDAR 1921-1922

L. J. ROGERS, B.A.Sc., <i>Assistant Professor of Analytical Chemistry.</i>	29 Rosemount Ave.
E. M. WALKER, B.A., M.B., <i>Associate Professor of Biology.</i>	67 Alcina Ave.
T. L. WALKER, M.A., Ph.D., <i>Professor of Mineralogy.</i>	20 Avondale Ave.

### Sessional Appointments.

H. S. MCKELLAR, B.A., <i>Lecturer in French.</i>	139 Rushton Rd.
G. C. PATTERSON, B.A., <i>Lecturer in Spanish.</i>	342 Berkley St.
J. E. THOMSON, B.A.Sc., <i>Lecturer in Mineralogy.</i>	57 Queen's Park
MISS M. E. G. WADDELL, M.A., <i>Fellow in Mathematics.</i>	32 Madison Ave.

**FACULTY OF APPLIED SCIENCE AND ENGINEERING.****Historical Sketch.**

The Legislative Assembly during the Session of 1877 gave its sanction to the establishment of a School of Practical Science on the basis proposed in the memorandum of the Minister of Education confirmed by the Lieutenant-Governor in Council on the 3rd day of February, 1877.

By the scheme thus approved of, Government effected an arrangement with the Council of University College whereby the students of the School of Practical Science enjoyed full advantage of the instruction given by its professors and lecturers in all the departments of science which were embraced in the work of the School.

This arrangement was brought to an end in 1889 by the transfer of the department of science above referred to, from University College to the University of Toronto under the operation of the University Federation Act.

In order that the students of the School might continue to enjoy the advantage of the instruction of the above departments, the Senate of the University of Toronto passed a Statute in October, 1889, affiliating the School to the University, which Statute was confirmed by the Lieutenant-Governor on the 30th day of October, 1889.

By an Order-in-Council, approved by the Lieutenant-Governor, on the 6th day of November, 1889, a Principal was appointed, and the management of the School was entrusted to a council composed of the Principal as chairman, and the Professors, Lecturers and Demonstrators appointed on the Teaching Faculty of the School.

By the terms of this order the management and discipline of the School was vested in the Council.

By a Statute of the Senate of the University of Toronto, passed on December 14th, 1900, the teaching staff and examiners of the School of Practical Science, together with the examiners for the degree of B.A.Sc., and professional degrees in Engineering, were constituted ex-officio the Faculty of Applied Science and Engineering of the University of Toronto.

By an Order-in-Council dated the 30th day of January, 1903, the Council of the School was made to consist of the Principal, the Professors and Lecturers, together with the Registrar.

By the University Act, 1906, the School of Practical Science was united to the University of Toronto as its Faculty of Applied Science and Engineering.

### **GRADUATING DEPARTMENTS.**

There are seven Graduating Departments leading to the degree of Bachelor of Applied Science :—

1. Civil Engineering.
2. Mining Engineering.
3. Mechanical Engineering.
4. Architecture.
5. Analytical and Applied Chemistry. (discontinued).
6. Chemical Engineering.
7. Electrical Engineering.
8. Metallurgical Engineering.

The instruction in these departments extends over a period of four years and is designed to give the student a thorough knowledge of the scientific principles underlying the practice in the several professions, and also such training as may make him immediately useful when he commences professional work.

### **DEGREE OF MASTER OF APPLIED SCIENCE (M.A.Sc.).**

(For requirements, see page 73.)

### **PROFESSIONAL DEGREES.**

Graduates in Applied Science and Engineering, and graduates of the School of Practical Science, may, after three years spent in professional work, present themselves for the degrees of Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem. E.), as the case may be, subject to the rules and regulations established by the University. (see page 73.)

### **JUNIOR INSTRUCTORSHIPS.**

Provision is made for the sessional appointment in various departments of graduates as Fellows or Demonstrators, whose duties shall consist of aiding in the work of instruction under the direction of the department concerned.

Applications for appointment should be made in writing to the Secretary not later than September 1st.

### **SCHOLARSHIPS.**

The Boiler Inspection and Insurance Company of Canada offers a Scholarship in the Department of Mechanical Engineering of the value of \$130.00 to the student who obtains highest Honour Standing in the regular examinations of the third year.

The successful candidate will be expected to proceed to his fourth year during the session next following the date of the award.

The amount of the award will be credited by the Bursar to the fees of the fourth year of the successful candidate.

**MATRICULATION.**

1. The matriculation requirements of this Faculty are based upon those given in the curriculum for Junior Matriculation, a copy of which may be obtained on application.

2. A candidate for matriculation must produce satisfactory certificates of good character.

3. The requirements for admission comprise two parts which are as follows:

Part I, Pass Matriculation standing in the following subjects: English, History, Mathematics and three of Greek, Latin, French, German, Spanish, Experimental Science. The candidate is recommended to choose French, German and Experimental Science as his optional subjects in Part I.

Part II, Honour Matriculation standing as follows: Honours (at least 50 per cent.) in Honour Mathematics, Pass standing (at least 40 per cent.) in Honour English, Pass standing (at least 40 per cent.) in one of the following Honour subjects—Greek, Latin, French, German, Spanish. The candidate is recommended to choose French as his option in Part II.

Notice is hereby given that it is the intention of the University to increase the requirements for admission for the Session 1922-23. The details of the changes will be announced as soon as possible.

4. The pass matriculation standard is forty per cent. of the marks, assigned to a paper, with an average of sixty per cent.

5. A candidate who has obtained an average of sixty per cent. on all the pass papers but has failed to obtain forty per cent. in not more than three papers may complete pass matriculation by passing on these papers at any one subsequent examination.

6. A candidate who has obtained forty per cent. on each of at least eight pass papers, with an average of sixty per cent. on the same, will be credited with these papers. In order to complete pass matriculation, he must obtain at one subsequent examination forty per cent. on each of the remaining papers, with an average of sixty per cent.

7. The examination for pass and honour Junior Matriculation is held annually in June at centres in Ontario, and, if application is made to the Senate, the examination may, with the co-operation of the Department of Education, be held at centres outside Ontario.

8. Applications for the June examinations must be sent not later than the 15th of May to the local Public School Inspector, or in the case of candidates intending to write at the University, to the Registrar.

9. A Supplemental Matriculation examination at which pass and honour papers will be set, will be held in September at the University and at such other centres as may from time to time be authorized. Candidates entitled to the privileges of supplemental examinations, as well as new candidates, may present themselves at this examination.

10. Applications to write on the September examination, together with the necessary fee, must be received at the Department of Education not later than September 1st, for those who wish to write at any centre established in Ontario, and not later than August 1st for any centre elsewhere in Canada.

11. Forms of application, the time-table of the September examination, and further particulars may be had upon application to the Department of Education.

### **ADMISSION.**

A candidate for admission must have completed the seventeenth year of his age on or before the first of October of the year in which he seeks to enter.

Applications for admission must be made on blank forms supplied by the Registrar, and should be forwarded as early as possible to the Registrar of the University.

Applications will be considered from (a) those who have completed the pass and honour matriculation requirements, including those who hold certificates recognized as equivalent—see matriculation curriculum—, (b) those who have failed in not more than two papers of the pass matriculation examination. The latter must complete matriculation before being eligible to enter the second year.

Applications based upon other certificates than those mentioned will be considered as occasion may require. Such certificates must be accompanied by an official statement of the marks in the various subjects upon which the certificate was granted.

#### **ADMISSION AD EUNDUM STATUM.**

An undergraduate of another University may be admitted *ad eundem statum* on such conditions as the Senate on the recommendation of the Council of the Faculty may prescribe.

An applicant for admission *ad eundem statum* must submit with his petition (1) a calendar of his University giving a full statement of the courses of instruction; (2) an official certificate of character and academic standing.

### **REGISTRATION.**

Registration in the various years will begin Sept. 1st. Blank cards for the purpose will be supplied by the Secretary on request. (See "Dues and Deposits," next page.)

### **FEES.**

All fees are payable at the Bursar's office between the hours 10 a.m. and 1 p.m. of each week day except Saturday.

The annual fees including tuition, library, laboratory supplies and one annual examination shall be as follows:

**First Year.**

If paid in full on or before November 5th .....	\$100.00
By instalments.	

First instalment, if paid on or before November 5th.....	50.00
Second instalment, if paid on or before February 5th.....	55.00

**Second Year.**

If paid in full on or before November 5th.....	\$110.00
By instalments:	

First instalment, if paid on or before November 5th.....	55.00
Second instalment, if paid on or before February 5th.....	60.00

**Third and Fourth Years.**

If paid in full on or before November 5th.....	\$120.00
By instalments:	

First instalment, if paid on or before November 5th.....	60.00
Second instalment, if paid on or before February 5th.....	65.00

**Repeating the Year.**

If paid in full on or before November 5th.....	\$50.00
--	---------

The above fees are payable in advance. After November 5th a penalty of \$1.00 per month will be imposed until the whole amount is paid. In the case of payment by instalments the same rule as to penalty will apply.

Students desiring to pay in instalments must have paid the fees due in the first term before proceeding to the work of the second term.

**General Fees.**

Matriculation, or registration of Matriculation .....	\$5.00
Supplemental examination.....	10.00
Admission <i>ad eundem statum</i> .....	10.00
Hart House.....	11.00
Degree of B.A.Sc. (payable not later than April 1st).....	10.00
Degree of M.A.Sc.....	25.00

**Dues and Deposits.**

(Payable to the Secretary of the Faculty at the time of registration.)

Engineering Society membership.....	\$2.00
Annual deposit, Departments 1, 3, 4, 7.....	3.00
Departments 2, 6, 8.....	8.00

Charges for waste, neglect and breakage are to be met out of the deposit fee, the balance of which will be refunded to the student at the end of the session.

**Hart House and the Students' Administrative Council.**

The annual fee.....	\$11.00
---------------------	---------

Every male student in attendance, proceeding to the degree of Bachelor of Applied Science, is required to pay to the Bursar at the time of the entry of his name with the Secretary the annual fee of eleven dollars for the maintenance of Hart House and the Students' Administrative Council.

### **Women Students' Administrative Council Fee.**

Every woman student proceeding to the degree of Bachelor of Applied Science is required to pay to the Bursar at the time of the entry of her name with the Registrar the annual fee of three dollars for the maintenance of the Women Students' Administrative Council.

### **GENERAL INFORMATION FOR STUDENTS**

The Council of University College and the governing bodies of the federated universities and colleges, respectively, have disciplinary jurisdiction over and entire responsibility for the conduct of their students in respect of all matters arising or occurring in or upon their respective college buildings and grounds, including residences.

The councils of such of the faculties as have assigned for their separate use any building or buildings and grounds, including residences, have disciplinary jurisdiction over and entire responsibility for the conduct of all students in their respective faculties in respect of all matters arising or occurring in or upon such building, or buildings and grounds.

In all such cases, and, save as aforesaid, as respects all students to whatsoever college or faculty they may belong, disciplinary jurisdiction is vested in the Caput, but the Caput may delegate its authority in any particular case or by any general regulation to the council or other governing body of the university or college or faculty to which the student belongs.

The Caput has also power and authority to determine by general regulations, or otherwise, to what college, faculty or other body the control of university associations belongs.

If there be any questions as to the proper body to exercise jurisdiction in any matter of discipline which may arise, the same shall be determined by the Caput, whose decision shall be final.

Disciplinary jurisdiction includes the power to impose fines.

### **HART HOUSE.**

Hart House, the gift of the Massey Foundation, is the Undergraduates' Union of the University of Toronto.

Hart House contains completely equipped club rooms, including common rooms, reading room, music room, lecture room, sketch room, photographic dark rooms, the Great Hall, used as a dining hall, a small chapel, the offices and class rooms of the Students Christian Association, gymnasium and swimming pool, rifle range, billiard room and the Hart House theatre.

All male students proceeding to a degree in the University are members of Hart House. An annual fee imposed by the University, covers the fee of the Students' Administrative Council, all club fees in connection with Hart House, and membership in the Athletic Association, including the medical examination.

Other male students in the University, or students in the affiliated or federated institutions receiving instruction in the University, may become members of Hart House on payment of the required fee.

Graduates are entitled to the full privileges of Hart House on payment of an annual fee of \$10.00. Out-of-town graduates may become members on payment of an annual fee of \$2.50.

A group of rooms is set apart for the use of the Faculty Union. There is also a common room for the use of graduates. Five guest rooms are available for the use of guests, for periods of a week or less, at a reasonable rental.

The Theatre is under the management of the Players' Club of the University of Toronto, and is available for productions by any of the Dramatic Clubs within the University.

For further information, apply to the Warden of Hart House.

### **REGULATIONS RESPECTING STUDENTS.**

No student will be enrolled in any year, or be allowed to continue in attendance, whose presence for any cause is deemed by the Council to be prejudicial to the interests of the University.

All interference on the part of any student with the personal liberty of another, by arresting him, or summoning him to appear before any unauthorized tribunal of students, or otherwise subjecting him to any indignity or personal violence, is forbidden by the Council. In particular, students of all Faculties are warned against the practices known as the "hustling" of freshmen and against inter-year or inter-faculty "hustles". Any student convicted of participation in such proceedings will render himself liable to expulsion from the University.

All students shall be in attendance during the whole of each term. Those whose attendance of work is reported as unsatisfactory are liable to dismissal by the Council.

No student will be allowed to repeat the work of any year more than once.

Information as to the text-books, instruments and materials to be purchased by the students will be given on registration at the beginning of the session.

### **STUDENTS' ADMINISTRATIVE COUNCIL.**

The Students' Administrative Council has been entrusted by the Caput with supervision of the conduct of the students, and has disciplinary powers to deal with violations of the regulations governing conduct.

Any student who may be convicted of having taken part in a parade or procession through the city which has not been authorized by the police authorities after application by the Executive of the Students' Administrative Council, will be severely disciplined.

### **WOMEN STUDENTS' ADMINISTRATIVE COUNCIL.**

The Women Students' Administrative Council is the representative organ of the women students of the University of Toronto, and aims to co-ordinate all intercollegiate activities. It consists of representatives from all colleges and faculties. A fee of \$3 is paid for the council by each woman student proceeding to the Bachelor's degree. The council assumes joint financial responsibility with the men's council for the publication of *Varsity*, *Toronto-nensis*, and the *Directory*.

### **PHYSICAL TRAINING.**

By order of the Board of Governors each male student proceeding to a degree must take Physical Training in the first and second years of his attendance. He must first undergo a medical examination by the Physical Director of the University to determine the character of his training.

### **OPTIONS.**

In the fourth year, optional courses are arranged in certain departments. Students are required to submit their selection to the Secretary in writing, not later than September 15th. The proposed selection must be approved by Council before adoption.

### **REGULATIONS RESPECTING EXAMINATIONS.**

#### **Regular Examinations.**

Promotions from one year to another are made on the results of the annual examinations. Students proceeding to a degree must pass all the examinations in the subjects of his or her course and at the periods arranged from time to time by the Council.

Candidates who fail in passing the annual examinations will be required to take again the whole course of instruction, both theoretical and practical, of the year in which they fail before presenting themselves a second time for examination.

A student who in either term of the session fails to perform the work of his course in a manner satisfactory to the professors in charge, will not be allowed to present himself at the final examinations of the year.

In the second, third and fourth years annual examinations will be held at the beginning of the second term on all subjects completed during the first term.

No student will be allowed to write at the annual examinations who has not paid all fees and dues for which he is liable.

The minimum percentage of marks required to pass in the written examination will be fixed from time to time by the Council.

The minimum percentage of marks required to pass in the practical work connected with any subject shall be one and one-half times the minimum required in the case of a written examination.

In order to pass the practical examinations in the subjects of applied mechanics, descriptive geometry, electrical design, optics, surveying and architecture, the drawings set in these subjects must be made.

### **Term Examinations.**

Term examinations may be held in any subject and at any time at the discretion of the instructor or by order of the Council, and the results of such examination may, if the Council so decides, be incorporated with those of the annual examinations in the same subjects.

### **Supplemental Examinations.**

A candidate who fails in one or two subjects at the Annual Examinations will be required to take supplemental examinations in such subjects.

The supplemental written examinations will begin on the 23rd of September, 1921. Candidates are required to send to the Secretary of the Faculty not later than the 15th of September, notice in writing of their intention to take such examinations, and to remit to the Bursar the fee of \$10.00. A penalty of \$1.00 will be imposed upon all candidates who fail to give notice within the time stated.

In the case where a candidate fails to pass a supplemental examination it will count as one of the two supplemental examinations which may be allowed him after the next annual examination.

### **Vacation Work.**

Vacation work must be handed in on or before the first day of the session.

Vacation notes must be on construction only, except in Department 2 (see p. 72), and contain not less than twenty, nor more than thirty pages of sketches. These sketches must be freehand pencil drawings with figured dimensions.

Notes must be made in standard note books approved of by the Faculty. Notes which have been taken during the session in connection with the work in drawing will not count as vacation work.

The minimum percentage of marks required for practical work must be made in the case of vacation notes.

### **Shop Work.**

Students in Mechanical and in Electrical Engineering are not considered as having completed their course of study, nor are degrees granted until certificates have been submitted to the Council, and accepted as satisfactory, showing not less than eight months of mechanical experience in production of some kind under commercial conditions. Preferably the work undertaken should be in one of the manufacturing industries or trades with which the Course is related.

It is not desirable that any student in these Courses should enter sales or other non-production departments of the engineering industries without

having acquired some personal experience in mechanical production. It is best to obtain this experience under commercial conditions. Otherwise one can not at all appreciate shop conditions and limitations.

#### **Honours.**

Honours will be granted in each department to the students who obtain at least 40 per cent. in each subject, and 66 per cent. of the total number of marks allotted to the department at the annual examinations.

Honour Graduate standing will be granted to those who obtain honours in the final and in one previous year.

#### **REGULATIONS RESPECTING TERM WORK.**

Students working in any laboratory must be governed by the regulations relating thereto as made known from time to time.

No laboratory reports or drawings may be removed from the laboratories without permission. The Council reserves the right to dispose of them as may be thought proper.

#### **Field Work.**

Field Work in Surveying of the First and Second Years will be taken on the University grounds, during the session.

The Field Work of the Third Year, for the session 1921-1922, will be taken previous to the session, during the months of August and September, 1921, on a tract of land lately purchased by the University, situated on the shore of Gull Lake, and about five miles from the Village of Minden, and being Lot No. 9 in 13th Concession of the Township of Lutterworth. The camp may be reached by taking the train leaving Lindsay for Haliburton, and getting off at Gelert.

Students of the Third Year, Department 1, are expected to reach Gelert in the afternoon of August 20th, and those of Department 2, on September 3rd, when conveyances will meet them to take them to the camp. Personal effects must be limited to sixty pounds in weight, which must include two pairs of blankets, or their equivalent; beds and mattresses only will be provided.

No field notes will be counted which have not been taken in the field and during the hours allotted to such work.

Students taking practical astronomy are required to take observations in the field for time, latitude, and azimuth.

#### **Drafting Rooms.**

Drawings and briefs for same, that are required to be finished the first term of the session will not be counted unless finished in that term.

The minimum number of drawings in first and second years shall be twenty-five, and the maximum number thirty-five.

No drawings or briefs for same will be counted which have not been made in the drafting rooms, and during the hours allotted to such work.

**Theses.**

In the Fourth Year each student is required to prepare a thesis on a subject approved by the Council. The title of the thesis must be sent to the Secretary of the Faculty for approval on or before November 1st, and the completed thesis must be handed in not later than the first day of the second term and shall become the property of the University. The rules governing size, form, etc., may be obtained on application to the Secretary.

**EXEMPTIONS.**

Applications for exemption from any of the regulations must be made to the Council in writing and the particulars of the case fully stated.

**COURSES OF INSTRUCTION.**

On the following pages the courses of instruction in the various departments are set forth in detail. The time devoted to the various subjects, both for lectures and practical work, is indicated as accurately as possible but is subject to modifications from time to time as occasion seems to require. In the First Year the course is common to all departments except Architecture and Chemical Engineering (courses 2 and 6). In the Second Year the courses in Mechanical and Electrical Engineering (courses 3 and 7) are identical.

**1. DEPARTMENT OF CIVIL ENGINEERING.**

The courses of study in Civil Engineering are designed to give the student a sound training in the fundamental scientific principles on which the practice of the profession is based. The instruction is given by means of lectures and practical work in the field, the drafting room and the laboratory. In this way the student is led to apply the principles developed in the class room.

**First Year.**

The same also for Mining, Mechanical, Electrical and Metallurgical Engineering.

Subject	No.	Hours per week.			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Algebra.....	187	2			2
Plane Trigonometry.....	189	2			
Analytical Geometry.....	188	1			2
Descriptive Geometry.....	115	1			1
Surveying.....	205, 206	1	5	1	
Statics.....	10	2			2
Dynamics.....	11	2			2
Elementary Chemistry.....	75	2			2
Electricity.....	135	2			2
Engineering Problems.....	193	1			1
Drawing.....	117		11		20

**Second Year.**

Vacation Work.....	220				
Calculus.....	190	2			2
Spherical Trigonometry.....	191	1			
Elementary Astronomy.....	55	1			1
Descriptive Geometry.....	121	1			1
Surveying.....	207, 208	1	9	1	
Dynamics.....	12	1			1
Mechanics of Materials .....	13	2			2
Optics.....	197	1	1½	1	1½
Hydrostatics.....	196			1	1
Engineering Chemistry.....	85			1	
Organic Chemistry.....	87	1			
Mineralogy.....	159, 161	2	1		2
Metallurgy.....	183			1	
Finance.....	66	1			1
Drawing.....	123		6		12
Chemical Laboratory .....	81		3		3

**Civil Engineering—Third Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y
Least Squares.....	192			1	
Practical Astronomy and Geodesy.....	56, 57	2		2	
Surveying and Levelling.....	209, 210	1		1	
Descriptive Geometry.....	127	1			
Hydraulics.....	29, 30	2		2	3
Photography.....	199	1	1½		1½
Stress Graphics.....	19a	1		1	
Theory of Structures.....	18	2		2	
Cements and Concrete.....	21			1	
Engineering Chemistry.....	94	1		1	
Geology.....	150	1		1	
Commercial Law.....	67	1		1	
Heat.....	198	1	1½		
Mechanics of Materials .....	14		3		
Drawing.....	128		8		18

**Fourth Year.**

†Foundations.....	20	1	1	1	1
†Thermodynamics.....	34, 39a	1		1	2
Economic Geology.....	151	1		1	
Contracts and Specifications	68			1	
Thesis.....	219				
And one of					
(a) { Astronomy.....	58, 59	2	23	2	
Geodesy.....	60	2		2	23
(b) { Sanitary Engineering	213	1½	16	1½	16
Highway Engineering.....	214	1	6	1	6
(c) Structural Engineering	215	6		7	
Mechanics of Materials					
Laboratory.....			3		6
Structural Design					
Drawing.....	133		17		16
(d) Mechanics of Materials	16, 17, 22, 23	3½		3½	

**Fourth Year (Continued).**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Mechanics of Materials					
Laboratory.....			5		6
Structural Design					
Drawing.....	133a		6		5
with either:					
(1) Hydraulics.....	31, 31a, 32	3	10	3	10
or					
(2) Railway Engineering..	211, 212	2	11	2	11

† Not required of those taking the Astronomy option.

## 2. DEPARTMENT OF MINING ENGINEERING.

The course in Mining Engineering is intended to serve as a preliminary training for those who expect to practise the art of mining or metallurgy. In the second year it differs very little from the course in civil engineering, in the third year some subjects peculiar to mining and metallurgy are taken up.

In general this course is designed to first give the student a good training in the parts of engineering essential to all branches, such as surveying, drafting, etc., and then in the upper years to allow him to follow studies peculiar to mining engineering.

Candidates for the degree in this department will be required to present satisfactory evidence of having had at least six months' practical experience in work connected with mining, metallurgy or geology, for which they must have received regular wages. Certificate forms, giving full details as to acceptable classes of work, will be furnished on application, and should be obtained by all students before entering employment.

**First Year.**—See page 24.

### Second Year.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Vacation Work.....	220				
Calculus.....	190	2		2	
Descriptive Geometry.....	121	1		1	
Surveying.....	207, 208	1	9	1	
Dynamics.....	12	1		1	
Mechanics of Materials.....	13	2		2	
Optics.....	197	1	1½	1	1½
Hydrostatics.....	194			1	1
Inorganic Chemistry.....	79	1			
Organic Chemistry.....	87	1			
Engineering Chemistry.....	85			1	
Mineralogy.....	157, 160	2	1		3
Geology.....	150	1		1	
Mining.....	170, 171	1	3		
Metallurgy.....	183			1	
Finance.....	66			1	
Drawing.....	123		3		12
Chemical Laboratory.....	81, 82		6		6

**Mining Engineering—Third Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Surveying and Levelling.....	209, 210	1			
Theory of Structures.....	19	2			
Engineering Chemistry.....	94	1		1	
Analytical Chemistry.....	80	1		1	3
Assaying.....	173	1	3		
Petrography.....	163	1		1	
Mineralogical Laboratory.....	164		2		2
Economic Geology.....	151, 156	1		2	2
Ore Deposits.....	155	1		1	
Mining.....	172			2	3
Hydraulics.....	29	2		2	
Ore Dressing.....	177	1		1	
Ferro-Metallurgy.....	181	1		1	
Metallurgy.....	184	1		1	
Commercial Law.....	67	1		1	
Drawing.....	129		7		2
Chemical Laboratory.....	93				11
Analytical Chemistry.....	91				9

**Fourth Year.**

Thermodynamics.....	34	1		1	
Electrochemistry.....	101	2			
Assaying.....	174			1	3
Petrography.....	165, 166	1	2	1	2
Geology, Archaean and Glacial.....	152, 154	2	1	2	
Geology, Mining.....	153	1		1	
Mining.....	175	1		1	
Ore Dressing.....	179	1		1	
Metallurgy.....	180, 182	1		1	
Mine and Plant Management	70	1		1	5
Milling.....	176				3
Power.....	32a, 39a, 141		3		2
Design.....	215		3		3
Chemical Laboratory.....	112		10		
Thesis.....	219		4		2

### 3. DEPARTMENT OF MECHANICAL ENGINEERING.

The course in this Department is designed to meet the needs of those students who are intending to take up the work connected with Mechanical Engineering, such as the design of gas engines, steam engines, steam boilers, steam turbines, air compressors, etc.; the design and installation of the machinery connected with power plants and central stations, steam piping and other similar problems. The work is also so arranged that the student becomes somewhat familiar with the design of travelling cranes and mill buildings and similar problems connected with structural steel work.

Since the work of the mechanical engineer and of the electrical engineer is closely allied, the courses in these two departments in the first two years are identical and cover the subjects mentioned below.

In the third year the work becomes more specialized, the mechanical engineers paying more attention to heat engines of various types, and to mill building design and other work of similar nature. The study of electricity is continued and the student gets considerable practice in the mechanical and electrical laboratories.

In the fourth year the student devotes himself still more closely to his chosen work, placing the greater stress on thermodynamics and the theory and testing of heat engines, and problems in machine design. Much time is spent in the mechanical laboratories testing gas and steam engines and other machines.

Before receiving the degree in this department candidates are required to present satisfactory evidence of having had at least eight months' practical experience in one of the principal trades connected with Mechanical Engineering, the object being that graduates may have some practical knowledge of the duties of the workman in this branch of engineering, as distinguished from those of the purely technical man. Certificate forms will be furnished on application. These forms contain full details in regard to the work required and should be obtained by the candidate before he enters his employment.

**Mechanical Engineering—First Year.**—See page 24..**Second Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Vacation Work.....	220				
Calculus.....	190	2			2
Descriptive Geometry.....	121	1			1
Dynamics.....	12	1			1
Theory of Mechanism.....	25	2			2
Steam Engines.....	38				1
Mechanics of Materials.....	13	2			2
Optics.....	197	1		1½	1
Hydrostatics.....	196				1
Electricity.....	138, 139	2	3	2	3
Engineering Chemistry.....	85				1
Organic Chemistry.....	87	1			
Finance.....	66	1			1
Drawing.....	124			14	10
Chemical Laboratory.....	81		3		3
Machine Tools.....	28a				1

**Third Year.**

Mechanics of Machinery.....	26	1			1
Machine Design.....	27	2	7	2	7
Thermodynamics.....	33, 35	2	2	2	2
Heat Engines.....	39	1		1	
Hydraulics.....	29, 30	2		2	1
Theory of Structures.....	19	2			
Stress Graphics.....	19a	1		1	
Magnetism and Electricity..	144, 142	2	4½	2	4½
Alternating Current.....	143	1		1	
Engineering Chemistry.....	96	1		1	
Commercial Law.....	67	1		1	
Mechanics of Materials.....	14		2		
Drawing.....	132		8		2

**Mechanical Engineering.—Fourth Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Structural and Mill Building					
Design.....	24, 24a, 134	2	3		3
Shop Management and Costs	69	1		1	3
Machine Design.....	28	1	4	1	
Thesis.....	219			1	6
And two of					
(d) Mechanics of Materials	16, 17, 22, 23	3½		3	
(e) Hydraulics.....	31, 31a, 32	3	10		10
Mechanics of Materials				3½	
Laboratory.....			6		
Structural Design					3
Drawing .....	134a		4		6
(g) Thermodynamics.....	36, 36a, 37	3	10	3	10

#### 4. DEPARTMENT OF ARCHITECTURE.

The instruction in this department is arranged to lay a broad foundation for the subsequent professional life of its graduates, and incidentally to prepare its students to be immediately useful in an architect's office. The curriculum has been arranged to meet the aesthetic and scientific needs of the profession, and includes History and Principles of Architecture, Free-hand Drawing in pencil, ink and colour, Modelling, Architectural Design, Analysis and Criticism of Buildings, Mathematics, Statics, Strength and Elasticity of Materials, Theory of Construction and Heating and Ventilation.

The equipment of the department includes a working library, a large file of periodicals, photographs, lantern slides, and a large collection of models and casts.

#### SUBJECTS OF INSTRUCTION.

##### First Year.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Analytical Geometry.....	188	1		2	
Descriptive Geometry.....	116	1		1	
Building Measurement.....	52	1	9	1	
Statics.....	10	2		2	
Elementary Chemistry.....	75	2		2	
Elements of Architecture....	45	1		1	
History and Principles of Architecture.....	40	1	3	1	
French.....	217	2		2	
Drawing.....	118		9		18
Freehand Drawing.....	49		3		2
Modelling.....	50		2		2

**Second Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Vacation Work.....	220				
Calculus.....	190	1		2	
Descriptive Geometry.....	122	1		1	
Mechanics of Materials.....	13	2		2	
Illumination.....	200	1		1	$1\frac{1}{2}$
Architectural Design.....	46	1		1	
History of Architecture.....	41	1		1	
History of Ornament.....	43	1		1	
French.....	217	1		1	
Finance.....	66			1	
Drawing Architectural Design }.....	125		17		17
Freehand Drawing }	49a		3		3
Modelling.....	50a		2		2

**Third Year.**

Descriptive Geometry.....	131	1			
Acoustics.....	195	1		$1\frac{1}{2}$	1
History of Architecture.....	42	1			1
History of Painting and Sculpture.....	44	1			1
Architectural Design.....	47	1			1
Building Materials.....	53	2			2
Theory of Structures.....	19	2			
Cements and Concrete.....	21				1
Commercial Law.....	67	1			1
Mechanics of Materials.....	14				2
Photography.....	199	1		$1\frac{1}{2}$	$1\frac{1}{2}$
Modelling.....	50b		2		2
Water Colour Painting.....	49b		3		3
Drawing Architectural Design }.....	130		7		22

**Fourth Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Mechanics of Materials.....	22	1		1	6
Structural Design.....	26	1	1	1	1
Heating and Ventilating....	54a	1		1	
Sanitary Science.....	54	1		1	
Contracts and Specifications	68			1	
Thesis.....	219		3		3
Drawing from life.....	49c		3		3
Modelling from life.....	50c		2		2
And one of					
(l) Architectural Design..	48	2	17	2	17
(m) Architectural Engineering.....	216	4	19	3	23

**6. DEPARTMENT OF CHEMICAL ENGINEERING.**

In many industries there is a demand for a man who combines the technical knowledge of the mechanical engineer with a knowledge of chemistry. It is to fill this want that the course in Chemical Engineering is designed.

**First Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Algebra.....	187	2			2
Plane Trigonometry.....	189	2			
Analytical Geometry.....	188	1			2
Descriptive Geometry.....	115	1			1
Statics.....	10	2			2
Dynamics.....	11	2			2
Elementary Chemistry.....	75	2			2
Mineralogy Laboratory.....	158				3
Electricity.....	135	2			2
Biological Laboratory.....	62			3	
Engineering Problems.....	193	1			1
Drawing.....	119			4	
Chemical Laboratory.....	78			10	
German.....	218	1			1

**Second Year.**

Vacation Work.....	220				
Calculus.....	190	2			2
Strength of Materials.....	13	2			2
Electricity.....	138, 139	2	3	2	3
Engineering Chemistry.....	85				1
Industrial Chemistry.....	86	1			1
Organic Chemistry.....	88	2			2
Organic Chemistry.....	89		7		
Physical Chemistry.....	90	2			2
Inorganic Chemistry.....	79	1			
Optics.....	197	1	1½	1	1½
Hydrostatics.....	196			1	
German.....	218	1			1
Finance.....	66	1			1
Drawing.....	126		7		3
Chemical Laboratory.....	84		12		10
Metallurgy.....	183			1	
Machine Tools.....	28a				1

**Third Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Theory of Structures.....	19	2			
Thermodynamics.....	33, 39a	2	2	2	
Electrochemistry.....	101, 102	2	3		
Engineering Chemistry.....	96	1		1	
Organic Chemistry.....	97	2		2	
Industrial Chemistry.....	95	1		1	
Analytical Chemistry.....	80	1		1	
Metallurgy.....	186	1		1	
Ferro-Metallurgy.....	181	1		1	
Chemical Plant.....	96	1		1	
Hydraulics.....	29, 30	2		2	1
Commercial Law.....	67	1		1	
German.....	218	1		1	
Assaying.....	173				3
Drawing.....	132		3		3
Chemical Laboratory.....	92		8		11

**Fourth Year.**

Machine Design.....	27	2	4½		
Inorganic Chemistry.....	103	1	3	2	
Organic Chemistry.....	106	1	13	1	
Shop Management and Costs	69	1		1	
Power.....	141		2		2
German.....	218	1		1	
Thesis.....	219				
And one of					
(h) Electrochemistry.....	108	2	9	2	24
(i) Industrial Chemistry..	106, 107	1	10	1	25
(j) Sanitary and Forensic Chemistry and Bac- teriology.....	64, 110, 112	1	10	2	24
(k) Metallurgy.....	180	1	10	1	25

## 7. DEPARTMENT OF ELECTRICAL ENGINEERING.

The course in Electrical Engineering is arranged to provide preliminary training for those who would follow any of the various lines of activity connected with electrical industry.

The first two years of the course are devoted to fundamental scientific principles, and incidentally more or less of their application to engineering problems in mechanical, civil and electrical work. Many problems are solved in the drafting rooms by graphical methods. The third year includes further theoretical work, more particular attention being given to electrical and mechanical studies in theory, operation and design. The fourth year is devoted to advanced work in alternating current theory and practice combined with similar study in thermodynamics, hydraulics or electrochemistry.

A large amount of laboratory practice is provided, most of which belongs to the third and fourth years. In this last year most of the time is spent in laboratory investigations and studies resulting therefrom.

Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in one of the principal trades connected with Electrical Engineering, the object being that graduates may have some practical knowledge of the technique of this branch of engineering. Certificate forms will be furnished on application. These forms contain full details in regard to the work required.

**First Year.**—*See page 24.*

**Electrical Engineering.—Second Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Vacation Work.....	220				
Calculus.....	190	2		2	
Descriptive Geometry.....	121	1		1	
Optics.....	197	1	1½	1	1½
Hydrostatics.....	196			1	1
Dynamics.....	12	1		1	
Mechanics of Materials.....	13	2		2	
Theory of Mechanism.....	25	2		2	
Steam Engines.....	38			1	
Electricity.....	138, 139	2	3	2	3
Engineering Chemistry.....	85			1	
Organic Chemistry.....	87	1			
Finance.....	66	1		1	
Drawing.....	124		12		12
Chemical Laboratory.....	81		3		3
Machine Tools.....	28a			1	

**Third Year.**

Mechanics of Machinery.....	26	1		1	
Machine Design.....	27	2	4½	2	4½
Hydraulics.....	29, 30	2		2	1
Thermodynamics.....	33, 35	2	2	2	1½
Heat Engines.....	39	1		1	
Electrochemistry.....	101, 102	2	3		
Magnetism and Electricity..	142	2		2	
Alternating Current.....	143	1		1	
Electrical Design.....	145	1	3	1	3
Electrical Laboratory.....	144		6		6
Engineering Chemistry.....	94	1		1	
Commercial Law.....	67	1	.	1	

**Fourth Year.**

Applied Electricity.....	146, 147	3	20	3	20
Shop Management and Costs.....	69	1		1	
Thesis.....	219				
And one of:					
(e) Hydraulics.....	31, 31a, 32	3	10	3	10
(g) Thermodynamics.....	36, 36a, 37	3	9	3	9
(h) Electrochemistry.....	108, 109	2	9	2	9

### 8. DEPARTMENT OF METALLURGICAL ENGINEERING.

The object of this course is to provide instruction and preliminary training for those who intend to become metallurgical engineers. Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in metallurgical work.

**First Year.—See page 24.**

### Second Year.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Calculus.....	190	2		2	
Descriptive Geometry.....	121	1		1	
Dynamics.....	12	1		1	
Mechanics of Materials.....	13	2		2	
Hydrostatics.....	196			1	
Steam Engines.....	38			1	
Inorganic Chemistry.....	79	1			
Physical Chemistry.....	90	2		2	
Finance.....	66	1		1	
Chemical Laboratory.....	83		14		.9
Mineralogy.....	169		1		1
Mining.....	170, 171	1	3	1	
Metallurgy.....	183, 185	1		2	
Spanish.....	218a	1		1	
Drawing.....	126		7		3
Engineering Chemistry.....	85			1	

**Metallurgical Engineering.—Third Year.**

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y.	Lect.	Lab'y.
Theory of Mechanism.....	25	2		2	
Theory of Structures.....	19	2			
Commercial Law.....	67	1		1	
Analytical Chemistry.....	80	1		1	
Electrochemistry.....	101, 102	2	3		
Ferro-Metallurgy.....	181	1		1	
Cement and Concrete.....	21			1	
Assaying.....	173	1	3		3
Metallurgy.....	186		2		6
Mining.....	172			2	3
Ore Dressing.....	177	1		1	
Heat.....	198	1	1½		
Chemical Laboratory.....	93		5		10
Drawing.....	132		3		

**Fourth Year.**

Thermodynamics.....	34	1		1	
Heat Engines.....	39	1		1	
Ore Dressing.....		2	2	2	4
Assaying.....	174			1	3
Mine and Plant Management	70	1		1	
Plant Design.....	186 <sup>b</sup>	2		2	
Power.....	39 <sup>a</sup> , 141		2		2
Metallurgy.....	186 <sup>a</sup>	2	8	2	8
Thesis.....	219		6		6

**OUTLINE OF COURSES OF INSTRUCTION.****APPLIED MECHANICS.****10. STATICS:—*T. R. Loudon.***

Departments 1, 2, 3, 4, 6, 7 and 8, I Year; 2 hours per week; both terms.

This course of lectures deals with forces in a single plane, and concerns chiefly the calculation of tension, compression and shearing stresses in frame structures and solid beams. It also deals with the consideration of problems relating to friction.

**11. DYNAMICS:—*J. McGowan.***

Departments 1, 2, 3, 6, 7 and 8, I Year; 2 hours per week; both terms. This course of lectures deals with bodies having motion of translation in one plane; also with relative motion, momentum, work and energy.

Text book:—Tutorial Dynamics—Briggs and Bryan.

**12. DYNAMICS OF ROTATION:—*W. J. Loudon.***

Departments 1, 2, 3, 7 and 8, II Year; 1 hour per week; both terms. This course covers angular motion, including moments of inertia, simple harmonic motion, the pendulum, centres of mass, suspension and percussion, the simple theory of the fly-wheel and the governor.

Text book:—Dynamics of Rotation—Worthington.

**13. MECHANICS OF MATERIALS:—*P. Gillespie, C. R. Young.***

Departments 1, 2, 3, 4, 6, 7 and 8, II Year; 2 hours per week; both terms.

In this course the strength and elasticity of materials are mathematically treated. The stresses in such elements of structures as the tie rod, the beam, the strut and the member subjected to shear are investigated and the elementary principles of design established. In the lecture and drafting rooms through numerous problems involving the design of simple beams, columns, riveted connections, etc., these principles are exemplified. The work includes also the discussion of eccentric loading, suddenly applied loads and repeated stresses.

Reference Book:—Mechanics of Materials—Merriman.

## 42 UNIVERSITY OF TORONTO CALENDAR 1921-1922

### 14. MECHANICS OF MATERIALS:—*J. McGowan.*

Departments 1, 3 and 4, III Year; 3 hours per week; one term.

This course is intended to give the student an introduction to the experimental study of the strength and elasticity of materials. It is intended that he shall acquire some familiarity with the construction and operation of testing machines and with the properties of the ordinary building materials.

Reference Book:—Laboratory Instructions, Department of Applied Mechanics, U. of T., 1913.

### 16. THEORY OF STRUCTURES:—*J. McGowan.*

Departments 1 and 3, IV Year; 2 hours per week; both terms.

The work taken up in this course of lectures consists in swing bridges, arches, suspension bridges and some special features in column construction.

Reference Books:—Modern Framed Structures—Johnson. Typical Steel Railway Bridges—Thomson.

### 17. MECHANICS OF MATERIALS:—*P. Gillespie.*

Departments 1, 3 and 4, IV Year; a laboratory course of about  $4\frac{1}{2}$  hours per week.

This course of experiments is intended to give the student practice in investigating the elastic and physical properties of iron, steel, concrete, timber and other building materials.

Reference book:—Materials of Construction—Johnson.

### 18. THEORY OF STRUCTURES:—*C. R. Young.*

Department 1, III Year; 2 hours per week; both terms.

The work of the first term comprises a thorough discussion of combined stresses, restrained, continuous and trussed beams, multiple beam and box girders, plate girders and certain practical aspects of column design. A number of designs of girders and structural details are worked out in the class and drafting rooms.

The second term is given chiefly to the design of a riveted truss highway span and a riveted truss railway span, the complete designs being made in the lecture and drafting rooms.

### 19. THEORY OF STRUCTURES:—*C. R. Young.*

Departments 2, 3, 4, 6 and 8, III Year; 2 hours per week; first term.

The work is the same as that for Department 1 in the first term.

Text books:—Modern Framed Structures, Part III—Johnson, Bryan and Turneaure; Structural Problems—Young; Carnegie Pocket Companion; Cambria Steel.

19a. STRESS GRAPHICS:—*T. R. Loudon.*

Departments 1 and 3, III Year; one hour per week both terms.

This course of lectures deals mainly with graphic methods of solving stresses in framed structures. The construction of Shearing Force diagrams, Bending Moment diagrams and Influence Lines is also dealt with.

20. FOUNDATIONS, RETAINING WALLS AND DAMS:—*P. Gillespie, W. J. Smither.*

Department 1, IV Year; 1 hour per week; both terms.

This course of lectures is devoted to the design of the structures mentioned. Preparatory to the discussion of the practical aspects of the subjects, and in order to gain familiarity with the fundamental principles involved, a part of the first term is given over to the consideration of the theory of compound stress. The most approved forms of construction of retaining walls, footings, abutments, piers and dams are then described, and typical designs are worked out in the class and drafting rooms.

Text books and books of reference:—Retaining Walls for Earth—M. A. Howe; Walls, Bins and Grain Elevators — M. S. Ketchum; A Treatise on Masonry Construction—I .O. Baker; Design and Construction of Dams—E. Wegmann.

21. CEMENTS AND CONCRETE:—*P. Gillespie.*

Departments 1, 4 and 8, III Year; 1 hour per week; second term.

The manufacture, testing and use of Portland cement and the fundamentals of the theory of reinforced concrete are discussed in this course of lectures.

22. REINFORCED CONCRETE:—*P. Gillespie, W. J. Smither.*

Departments 1, 3 and 4, IV Year; 1 hour per week.

The theory of the strength of reinforced concrete elements including the beam, the slab, the T-beam and the column, is continued in this course.

The analysis of the monolithic arch by the elastic theory is discussed, and the student is required in the drafting room to apply his knowledge to the design of simple structures.

Reference books:—Principles of Reinforced Concrete Construction—Turneaure and Maurer; Reinforced Concrete Construction, Vol. I —Hool.

23. IRON AND STEEL:—*G. A. Guess.*

Taken by students in IV Year, who select the options (c) Structural Engineering, and (e) Strength and Elasticity of Materials.

Metallography—Mechanical Treatment, Heat Treatment; Metallurgy; Physical Properties; 1 lecture per week. Laboratory, second term.

24. STRUCTURAL DESIGN:—*C. R. Young, W. J. Smither.*

Departments 1 (*Structural Engineering Option*) and 4, IV Year; 1 hour per week; both terms. Department 3, 1 hour per week; first term. This course of lectures is devoted to the problems connected with the structural design of buildings of timber, steel and reinforced concrete. The various structural elements, such as the floors, columns, footings, walls and wind bracing, are fully discussed, and portions of typical buildings are designed in the class and drafting rooms.

Text books:—Handbook of Building Construction—Hool and Johnson; Architects' and Builders' Pocket Book—Kidder.

24a. MILL BUILDING DESIGN:—*C. R. Young, W. J. Smither.*

Departments 1 (*Structural Engineering Option*), 3 and 4 (*Architectural Engineering Option*), IV Year; 1 hour per week; first term.

Consideration is given in this course to the various types of mill buildings, to the conditions governing their choice and the details of construction in different materials. Designs of portions of mill buildings are worked out in the class and drafting rooms.

Text books:—Mill Buildings—Tyrrell; Steel Mill Buildings—Ketchum.

24b. MISCELLANEOUS STRUCTURES:—*W. J. Smither.*

Department 1 (*Structural Engineering Option* and *Sanitary and Highway Engineering Option*), IV Year; 1 hour per week, second term.

In this course of lectures the application of theoretical principles to the design of a variety of structures is made. Among those structures discussed are transmission line towers, elevated tanks and their supporting towers, standpipes, large pressure pipes, sewers, culverts, small highway bridges, sub-surface tanks and tall chimneys. Whenever possible the lecture work is followed up by designs in the drafting rooms.

**MACHINERY.**25. THEORY OF MECHANISM:—*J. H. Parkin.*

Departments 3 and 7, II Year; Department 8, III Year; 2 hours per week; both terms.

This course of lectures treats of the motions of machines, the latter being assumed to be of sufficient strength to resist acting forces. The formation of machines is dealt with in a general way and the efficiency of machines considered. Investigations of the velocities of points and links are made. The design of cams is considered. The design of gear teeth and the application of trains of gears are taken up, also problems in static equilibrium.

Problems are worked out in the drafting room in which the methods given are employed.

Text book:—Theory of Machines—Angus.

26. MECHANICS OF MACHINERY:—*J. H. Parkin.*

Departments 3 and 7, III Year; 1 hour per week; both terms.

In this course the questions dealt with are the construction of acceleration diagrams, the determination of the accelerations of various parts of machines, the kinetic energy of machines, the effect of the weights and accelerations of parts on the velocity of the fly-wheel and the proper weight of the latter to fulfil given conditions. The theory of various forms of governors is taken up. The balancing of machines is fully studied and application is made to various machines.

Text book:—Theory of Machines—Angus.

27. MACHINE DESIGN—*J. H. Parkin.*

Department 3 and 7, III Year; lectures, 2 hours per week; both terms.

Department 6, IV Year; first term only.

The design work occupies 7 hours per week for Department 3,  $4\frac{1}{2}$  hours per week, first term only, for Department 6 and  $4\frac{1}{2}$  hours per week for Department 7.

Using the previous work in mechanics and kinematics as a groundwork, the lectures in this course deal with the design of shafting, journal bearings, gearing, flywheels, belting, springs, clutches, ball and roller bearings, machine supports, framing, etc.

The problems worked out in the design room are planned to include the principal parts of some complete machine such as an engine or machine tool.

Text book:—Elements of Machine Design—Leutwiler.

28. ADVANCED MACHINE DESIGN—*J. H. Parkin.*

Department 3, IV Year; lectures, 1 hour per week; design, 4 hours per week; both terms.

The work of this course gives practice in the design of complete machines from specifications, having regard for durability, safety, cost of materials, and difficulties in casting, machining and assembling. Mechanisms are developed to give required motions and control.

The lectures deal also with compound stress, helical and worm gearing.

Machine tools, jigs and fixtures and process machinery are discussed as far as time will allow.

28a. MACHINE TOOLS:—*J. H. Parkin.*

Departments 3, 6 and 7, II Year; 1 hour per week; second term.

This course of lectures is preparatory to those in Machine Design. It deals with casting, forging and the various machinery operations, together with the construction, operation and work of the principal machine tools.

The object of the course is to familiarize the student with the different shop methods and processes used in the production of machine parts to enable him to make proper provision in the design of such parts to facilitate their production.

Text book:—Text book of Advanced Machine Work—Smith.

**HYDRAULICS.**29. HYDRAULICS:—*R. W. Angus.*

Departments 1, 2, 3, 6, and 7, III Year; 2 hours per week.

This is an introductory course of lectures in hydraulics, and is devoted to the development and discussion of fundamental formulas relating to the flow of water in pipes, the measurement of discharge by various methods, such as orifices and weirs, the conditions of flow obtaining in open channels, artificial and natural, and in pipes flowing partially full, together with other kindred subjects.

The object of this course is to provide the student with a good working knowledge of the fundamental principle of hydraulics, such as is useful in practical work, and is necessary to the intelligent investigation of more advanced problems, such as the design of water supply, sewerage and irrigation system, and water power plants.

30. HYDRAULIC LABORATORY:—*R. W. Angus.*

Department 1, III Year; 3 hours per week; second term. Departments 3, 6, and 7, III Year; 4 periods of 3 hours each.

The work in this course is intended to illustrate the lecture course given in Hydraulics and to give the student some working acquaintance with the formulas met with in practice. Experiments are made to determine the coefficients for an orifice and the coefficients of discharge for a weir. The results of these experiments are used in measuring the discharge in subsequent experiments on meters and for the determination of hydraulic resistances in various cases of flow in pipes.

31. HYDRAULICS—*H. K. Dutcher.*

Departments 1, 3 and 7, IV Year; 1 hour per week; both terms.

A study of the collection and application of stream flow data is followed by an investigation of precipitation and evaporation and their relation to run-off. Flow in pipes is taken up, special attention being paid to exponential formulas, flow in branched pipes, water-hammer and measurement of flow. Flow over weirs and in open channels is also studied.

31a. HYDRAULICS:—*R. W. Angus.*

Departments 1, 3, and 7, IV Year; 2 hours per week, both terms.

The most important question considered and to which most of the lectures are devoted is the theory of turbines and centrifugal pumps, the effect of the design on the speed, discharge power and efficiency being fully taken up.

Text books:—Centrifugal Pumps—Daugherty; Hydraulics—Merriman; Water Power Engineering—Mead.

32. HYDRAULICS:—*R. W. Angus.*

Departments 1, 3 and 7, IV Year; about 10 hours per week.

A laboratory course devoted to experimental work on turbines of various types and centrifugal and turbine pumps and other similar devices. This experimental work is arranged to illustrate the lectures on turbine and pump design. The experiments are made on two large turbine pumps used in the laboratory supply, as well as on apparatus specially designed for instruction. Various methods of measuring water-power and the efficiency of machines are also given.

## 32a. POWER.

Department 2, IV Year; 24 hours.

A laboratory course of experiments on orifices, weirs and meters.

## 32c. HYDRAULICS.

Department 1, IV Year.

A laboratory course of four hours per week, first term, on measurement of water, flow in open channels and pumps.

**HEAT ENGINES.**33. THERMODYNAMICS:—*R. W. Angus.*

Departments 3, 6 and 7, III Year; 2 hours per week.

A lecture course in which the subject is treated in such a way as to make it of practical value and give a working acquaintance with the principles on which it is based. After the elementary ideas have been given and the proofs of the properties of Carnot's cycle, applications of the subject are made to the perfect gas air, saturated steam and to the various types of engines.

34. THERMODYNAMICS:—*N. P. F. Death.*

Departments 1, 2 and 8, IV Year; 1 hour per week; both terms.

This course is especially designed to give the student a working knowledge of thermodynamics as applied to the perfect gas and steam so that he will be able to understand clearly the action of air compressors, steam engines, etc. After deducing general principles, the efficiency of compressed air transmission and the relative merits of different types of compressors are discussed. The steam engine and boiler are also discussed.

## 35. THERMODYNAMICS AND MECHANICAL LABORATORY.

Department 3, III Year; 2 hours per week, first term; 3 hours per week, second term. Departments 7, III Year; 2 hours per week, first term;  $1\frac{1}{2}$  hours per week, second term.

This laboratory course is designed to assist in a clearer understanding of thermodynamics, machine design and mechanics of machinery. The work in thermodynamics consists in the setting of slide valves, indicating engines measuring the brake horse-power, simple engine and boiler tests and the testing of gas and gasoline engines under various conditions. The mechanical laboratory work deals with the efficiency of belts as well as of several machines of simple construction. An examination of lubricating oils is also made by means of well-known methods. Experiments are also made on the balancing of reciprocating and rotating masses.

36. THERMODYNAMICS:—*R. W. Angus.*

Departments 3 and 7, IV Year: 2 hours per week; both terms.

This is a continuation of the introductory course, the subject being here treated from a general standpoint and the idea of entropy and of the absolute scale of temperatures being introduced. The course includes the treatment of saturated and superheated vapours, gases, the flow of fluids, chimney and boiler efficiency and the theory of various engines and other appliances including air compressors, refrigerating machines, and injectors.

Text book:—Thermodynamics—Peabody.

36a. THERMODYNAMICS—*N. F. P. Death.*

Departments 3 and 7, IV Year; 1 hour per week, both terms.

Steam Power Plants. This course follows in logical order the courses on heat engines given in the second and third years. In it a study of the prime movers and auxiliary apparatus required in a power plant is made in such a manner as to indicate the proper choice of equipment under various conditions of operation.

37. THERMODYNAMICS:—*R. W. Angus.*

Departments 3 and 7, IV Year; about 10 hours per week.

The work in this year is a continuation and extension of the work covered in the third year laboratory course. Careful tests are made of engines of various types, such as simple, tandem and cross-compound steam engines; steam turbines; refrigerating machines; injectors and steam pumps, etc.; and an application is made of Hirn's analysis and the entropy diagram to the results obtained. A complete set of experiments is made on each machine and the result plotted so as to show clearly to the student the effect of various alterations in the adjustment of the engine on the resulting efficiency.'

Several modern gas and gasoline engines and a gas producer give ample opportunity for the study of this type of engine, and facilities are provided for sampling the gas supply and exhaust.

Two experimental stacks and three boilers enable results to be obtained on boiler efficiency and chimney draft.

38. STEAM ENGINES:—*N. P. F. Death.*

Departments 3, 7 and 8, II Year; one hour per week; second term.

This course of lectures includes a discussion of the principles of action of the steam engine; also the theory and design of various simple forms of valve gears used in the operation of such engines.

39. HEAT ENGINES:—*N. P. F. Death.*

Departments 3 and 7, III Year; Department 8, IV Year; one hour per week, both terms.

This course in heat engines is intended for students in Mechanical, Electrical and Metallurgical Engineering, to be supplementary to the general course of lectures in thermodynamics.

The principal commercial forms of heat engines are dealt with in a more or less descriptive manner; special attention is given to considerations affecting the design of the ordinary forms of steam engines, gas engines and oil engines.

39a. POWER:—*R. W. Angus.*

Departments 1, 2 and 8, IV Year; Department 6, III Year; 21 hours.

A course of experiments with steam and gas engines, compressed air, etc.

**ARCHITECTURE.**40. HISTORY OF ARCHITECTURE:—*Adrian Berrington.*

Department 4, I Year; one hour per week; both terms.

In this course the development of architecture is treated very briefly and in an elementary manner, from the Pyramids of Egypt to the

present, laying special emphasis on the Egyptian, Grecian and Western Asiatic work. The antique Greek and Roman orders are studied, and the students are required to make rendered drawings in the studio of certain orders and elements. An attempt is made to develop the student's sense of proportion, and in the latter part of the second term he is required to study a simple problem in design.

41. HISTORY OF ARCHITECTURE:—*Adrian Berrington.*

Department 4, II Year; one hour per week, both terms.

The Classical, Early Christian, Byzantine and Romanesque styles of architecture are studied with the aid of the lantern. The student is required to become acquainted with the best examples in these styles in order that his sense of proportion and his taste may be developed and his knowledge of the different elements extended.

42. HISTORY OF ARCHITECTURE:—*A. W. McConnell.*

Department 4, III Year; one hour per week, both terms.

In this course the work of the previous year is continued, with special attention to the study of the masterpieces of the Renaissance and modern buildings in planning and detail.

43. HISTORY OF ORNAMENT:—*H. H. Madill.*

Department 4, II Year; one hour per week, both terms.

In this course the development of Ornament is traced from the beginning through Egyptian, Assyrian, Grecian, Roman, Byzantine, Romanesque, Gothic and Renaissance styles. An attempt is made to analyze ornament of the best periods and to systematize the principles followed in form and colour. The development and types of mouldings are also studied.

44. HISTORY OF PAINTING:—*C. W. Jefferys.*

Department 4, III Year; one hour per week, first term.

The course will consist of an outline of the history and development of painting and of the minor pictorial arts from the earliest time until the present day.

44a. HISTORY OF SCULPTURE:—*J. L. Banks.*

Department 4, III Year; one hour per week, second term.

The course will consist of an outline of the history and development of the different eras of sculpture ranging from the primitive to the present day.

45. ELEMENTS OF ARCHITECTURE:—*H. H. Madill.*

Department 4, I Year; one hour per week, both terms.

Lectures on the Five Orders of Architecture, their affiliated forms and the other elements used in design. Simple problems in elementary design involving the use of the orders and other elements are set from time to time.

46. ARCHITECTURAL DESIGN:—*Adrian Berrington.*

Department 4, II Year; one hour per week, both terms.

This course is given by means of individual instruction in the classroom by criticisms of the solutions of different problems set during the year and by a series of lectures. It is in this course that the student begins the serious study of design; continued practice in architectural drawing and rendering affords the training necessary to make the student a proficient draughtsman.

47. ARCHITECTURAL DESIGN:—*A. W. McConnell.*

Department 4, III Year.

Theory and practice of Design.

This course is given by individual instruction in the studio and by lectures. The greater part of the course is devoted to problems in design, and forms a continuation of the course given in the preceding year.

8. ARCHITECTURAL DESIGN:—*Adrian Berrington.*

Department 4, IV Year.

The entire course is devoted to advanced academic training in designing the more monunmetal classes of buildings.

48a. ARCHITECTURAL DESIGN:—*A. W. McConnell and Adrian Berrington.*

Department 4, IV Year; Architectural Engineering Option.

A short course of lectures and studio work referring especially to the artistic side of the design of commercial buildings.

49. FREEHAND DRAWING AND WATER COLOUR PAINTING:—*C. W. Jefferys.*

Department 4, I Year; 3 hours per week, both terms.

Drawing from still life objects. Primary free hand perspective.  
Primary pencil charcoal and pen and ink rendering.

49a. Department 4, II Year; 3 hours per week, both terms.

Drawing and monochrome painting from still life.

Drawing from the cast.

Pencil, pen and ink, and monochrone rendering.

Primary water colour.

Drawing from landsacpe and natural objects.

49b. Department 4, III Year; 3 hours per week, both terms.

Drawing from the cast.

Water color from still life. Water color rendering.

Drawing from landscape and natural objects.

Students who are sufficiently advanced are admitted to the Fourth Year Life Drawing Class.

49c. Department 4, IV Year; 3 hours per week, both terms.

Water colour from still life and from landscape.

Drawing from life.

Water colour rendering.

50. MODELLING:—*J. L. Banks.*

Department 4; I Year; 2 hours per week, both terms.

The Orders. Synopsis of styles.

50a. Department 4; II Year; 2 hours per week, both terms.

The styles elaborated.

Problems in figures and in relation to architecture.

50b. Department 4; III Year; 2 hours per week, both terms.

Styles continued.

Problems, combination of figure, ornament and architecture, and their relative values.

50c. Department 4; IV Year; 2 hours per week, both terms.

Modelling from life.

Anatomy.

Composition of groups.

52. BUILDING MEASUREMENT:—*C. H. C. Wright.*

Department 4, I Year; 1 hour per week, both terms.

In this course of lectures the principles of measurements and mensuration with special reference to buildings will be discussed. With this is combined practice in measurements of existing buildings, quantities, etc.

53. BUILDING MATERIALS:—*C. H. C. Wright.*

Department 4, III Year; 2 hours per week, both terms.

The structural and aesthetic value of the various building materials.

54. SANITARY SCIENCE:—*C. H. C. Wright.*

Department 4, IV Year; 1 hour per week, both terms.

Modern plumbing, its design and installation.

54a. HEATING AND VENTILATING:—*C. H. C. Wright.*

Department 4, IV Year; 1 hour per week, both terms.

The design of different systems, where they should be used, heating specifications, etc.

## ASTRONOMY AND GEODESY.

55. ASTRONOMY, ELEMENTARY:—*C. A. Chant.*

Department 1, II Year; 1 hour per week, both terms.

A course in descriptive Astronomy, explaining the ordinary astronomical terms, and describing the various celestial bodies and their motions. In the evenings opportunity will be given for identifying the stars and for observing with telescopes.

Text book:—Manual of Astronomy—C. A. Young.

**56. ASTRONOMY AND GEODESY:**—*L. B. Stewart.*

Department 1, III Year; 2 hours per week.

The course of lectures deals with the determination of time, latitude, longitude and azimuth, by methods adapted to the use of the surveyor's transit and the sextant. It is designed to fulfil the requirements of the final examinations for Ontario and Dominion Land Surveyors.

In Geodesy an account is given of the principles and methods of a secondary triangulation survey, also of the principles involved in the North-West system of survey.

Text books:—Practical Astronomy as applied to Geodesy and Navigation—Doolittle; Nautical Almanac, 1922.

**57. FIELD WORK:**—*L. B. Stewart, S. R. Crerar.*

Department 1, III Year; about 1 hour per week, first term.

The practical work in this subject comprises observations in the field with the transit and sextant for the determination of time, latitude and azimuth by the methods described in the lectures.

**58. ASTRONOMY (Advanced):**—*L. B. Stewart.*

Department 1, IV Year; 2 hours per week.

The lecture course in this subject comprises the theory and adjustment of the instruments used in connection with a geodetic survey; the methods of taking and reducing observations for time, longitude, latitude, and azimuth, with the precision required on such a survey; and other matters relating to these subjects.

**59. GEODESY AND METROLOGY:**—*L. B. Stewart.*

Department 1, IV Year; 2 hours per week.

The lecture course includes a description of the methods of measuring base lines and the angles of a triangulation; the geometry of the spheroid with applications to geodetic problems; the computation of geodetic positions; the solution of large triangles on the earth's surface, and the adjustment of a triangulation; trigonometric and precise spirit levelling; the determination of the figure of the earth by arc measurements, and by the pendulum; the theory of map projections, etc.

**60. ASTRONOMY, GEODESY AND METROLOGY:**—*L. B. Stewart.*

Department 1, IV Year; about 23 hours per week.

The practical work in the above subjects includes the observation of meridian transits for time and longitude determinations, and of prime vertical transits for latitude, with the astronomical transit instrument; the observation of meridian zenith distances of stars, and of azimuths at elongation for latitude, with the alt-azimuth; theodolite observations for azimuth; observations for latitude

with the zenith telescope; the investigation of the constants of the instruments used, and the reduction of all observations; the measurement of a base line with the steel tape and with invar wires, and the determination of the constants of the tape; the measurement of the angles of a triangulation and the adjustment of the angles of network of triangles, etc.

## BIOLOGY.

### 62. ELEMENTARY BIOLOGY:—*J. H. Faull.*

Department 6, I Year; 3 hours per week, each term.

An elementary laboratory course on the nature and identification of plant and animal tissues and products, with microscope practice.

### 63a. ELEMENTARY BIOLOGY:—*E. M. Walker.*

Department 1, IV Year.

A special Course of Laboratory work and demonstrations in General Biology, five hours per week, second term.

### 64. HYGIENE AND BACTERIOLOGY:—*J. G. Fitzgerald, R. D. Defries.*

Departments 1 and 6, IV Year.

- (1) This is a course of twenty-five lectures, dealing with the principles of Hygiene and Sanitary Science and including a discussion of the facts in Bacteriology which are necessary for a proper understanding of Hygiene and Sanitary Science. The particular phases of the subject which are of importance from the standpoint of Sanitary Engineering are dealt with.
- (2) This is a laboratory course of five hours per week, second term, dealing especially with the Bacteriology of water, milk and sewage.

## ECONOMICS AND BUSINESS ADMINISTRATION.

### 66. FINANCE:—

All Departments, II Year; 1 hour per week, both terms.

Money and the instruments of credit; stocks and bonds.

### 67. COMMERCIAL LAW:—*A. R. Clute.*

All departments, III Year; 1 hour per week, both terms. General Principles of the Law of Contracts, Principal and Agent, Partnership and Limited Companies (with special reference to the Companies Acts). General view of the following:—Negotiable Instruments, Sale of Goods, Bills of Sale and Chattel Mortgages, Suretyship and Guarantee.

Text-Book:—Stephens' Elements of Mercantile Law (5th Ed., 1911.)

## FACULTY OF APPLIED SCIENCE AND ENGINEERING 55

### 68. CONTRACTS AND SPECIFICATIONS:—*C. R. Young.*

Departments 1 and 4, IV Year; 1 hour per week, second term.

This course of lectures deals with the fundamental principles of contract and specification writing. The critical examination of typical specifications and agreements by the class forms an essential feature of the instruction.

Text books:—Engineering Contracts and Specifications—Johnson; Elements of Specification Writing—Kirby; Principles of Specification and Agreement Writing—Young.

### 69. SHOP MANAGEMENT AND COSTS:—*H. W. Price.*

Departments 3, 5, 6 and 7, IV Year.

Works management, mechanical specifications, analysis of manufacturing costs, reports.

### 70. MINE AND PLANT MANAGEMENT.

Departments 2 and 8; IV Year; 1 hour per week, both terms.

First term:—*H. E. T. Haultain.*

Cost keeping in its relation to mining operations. The total cost of a ton of ore from the financier's point of view.

Second term:—*G. A. Guess.*

Lectures on labour, supplies and repairs as components of production costs. Plant organization, marketing of ores, smelter settlements, metallurgical economics, labour unions.

## CHEMISTRY.

### 75. ELEMENTARY CHEMISTRY:—*E. G. R. Ardagh.*

All Departments, I Year; 2 hours per week, both terms.

A lecture course in elementary chemistry dealing with the metals and non-metals, with experimental illustrations.

### 78. INORGANIC CHEMISTRY:—*L. J. Rogers.*

Department 6, I Year; 10 hours per week, both terms.

A laboratory course of quantitative experiments illustrating the use of the sensitive balance, and confirming the fundamental laws of chemistry; qualitative inorganic analysis; quantitative analysis of pure salts; inorganic preparations; molar weight determinations.

Text book:—Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

### 79. INORGANIC CHEMISTRY:—*E. G. R. Ardagh.*

Departments 2, 6 and 8, II Year; 1 hour per week, first term.

A lecture course on the chemistry of the metals; a continuation of Course 75.

80. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*

Departments 2, 6 and 8, III Year; 1 hour per week, both terms.

A lecture course on the principles of chemical analysis; select gravimetric and volumetric methods; technical analysis.

81. ANALYTICAL CHEMISTRY:—*E. G. R. Ardag.*

Departments 1, 2, 3 and 7, II Year; 3 hours per week.

Laboratory practice in elementary qualitative and quantitative analysis.

Text book:—A Smaller Chemical Analysis—Newth.

82. ANALYTICAL CHEMISTRY:—*J. W. Bain.*

Department 2, II Year; 3 hours per week, both terms.

A laboratory course in the gravimetric determination of metals and acids, with elementary volumetric analysis.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

83. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*

Department 8, II Year; about 12 hours per week.

A laboratory course comprising gravimetric and volumetric methods, acidimetry and alkalimetry.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

84. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*

Department 6, II Year; 11 hours per week, both terms.

A laboratory course in qualitative and elementary quantitative chemical analysis; inorganic preparations.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

85. ENGINEERING CHEMISTRY:—*J. W. Bain.*

Departments 1, 2, 3, 6, 7, and 8 II Year; 1 hour per week, second term.

A lecture course consisting of a study of the industrial production and application of heat and light, and of the chemistry of fuel and the products of combustion.

86. INDUSTRIAL CHEMISTRY:—*J. W. Bain.*

Department 6, II Year; 1 hour per week, both terms.

A lecture course on the manufacture of salts, acids, alkalies and inorganic chemicals.

87. ORGANIC CHEMISTRY:—*M. C. Boswell.*

Departments 1, 2, 3 and 7, II Year; 1 hour per week, first term.

A lecture course in elementary organic chemistry.

Text book:—Theoretical Organic Chemistry—Cohen.

88. ORGANIC CHEMISTRY:—*M. C. Boswell.*  
 Department 6, II Year; 2 hours per week, both terms.  
 A lecture course dealing with the aliphatic compounds.  
 Text book:—Theoretical Organic Chemistry—Cohen.
89. ORGANIC CHEMISTRY:—*M. C. Boswell*  
 Department 6, II Year; 7 hours per week, 1st term.  
 A laboratory course in Organic preparations.
90. PHYSICAL CHEMISTRY:—*F. B. Kenrick.*  
 Departments 6 and 8, II Year; 2 hours per week, both terms.  
 A course of lectures on the elements of chemical mechanics, and the theory of solutions.
91. ANALYTICAL CHEMISTRY:—*E. G. R. Ardagha.*  
 Department 2, III Year; 9 hours per week, for one term.  
 A laboratory course on the technical analysis of ores and furnace products.
92. INDUSTRIAL CHEMISTRY:—*E. G. R. Ardagha.*  
 Department 6, III Year; about 10 hours per week.  
 A laboratory course in industrial chemistry
93. ANALYTICAL CHEMISTRY:—*L. J. Rogers.*  
 Department 8, III Year; about 7 hours per week.  
 A laboratory course in metallurgical analysis.
94. ENGINEERING CHEMISTRY:—*J. W. Bain, E. G. R. Ardagha.*  
 Departments 1, 2, 3, 6 and 7, III Year; 1 hour per week, both terms.  
 A lecture course on the application of chemistry to engineering problems; air, water, sewage, the materials of construction, explosives, etc.
95. INDUSTRIAL CHEMISTRY:—*E. G. R. Ardagha.*  
 Department 6, III Year; 1 hour per week, both terms.  
 A lecture course on petroleum and its products, coal tar and its products; fats, oils, soap, sugar, starch, and gums; fermentation industries, etc.
96. CHEMICAL PLANT:—*J. W. Bain.*  
 Department 6, III Year; 1 hour per week, both terms.  
 A lecture course on the machinery and plant used in chemical manufacturing.
97. ORGANIC CHEMISTRY:—*M. C. Boswell.*  
 Department 6, III Year; 2 hours per week, both terms.  
 A lecture course on the aromatic series.  
 Text book:—Theoretical Organic Chemistry—Cohen.
98. ORGANIC CHEMISTRY:—*M. C. Boswell.*  
 Department 6, III Year; 9 hours per week, 6 weeks.  
 A laboratory course in organic preparations in the aromatic series; organic analysis.

101. ELECTROCHEMISTRY:—*W. L. Miller.*

Departments 6, 7 and 8, III Year; Department 2, IV Year; 2 hours per week, first term.

A lecture course on elementary electrochemistry, illustrated by experiments.

102. ELECTROCHEMISTRY:—*W. L. Miller and J. T. Burt-Gerrans.*

Departments 6, 7 and 8, III Year; 3 hours per week, first term.

A laboratory course in quantitative measurements to accompany Course 101.

103. INORGANIC CHEMISTRY:—*J. W. Bain.*

Departments 5 and 6, IV Year; 1 hour per week, first term; 2 hours per week; second term.

A lecture course on chemical theory.

104. ORGANIC CHEMISTRY:—*M. C. Boswell.*

Departments 5 and 6, IV Year; 1 hour per week, both terms.

A lecture course on advanced organic chemistry.

105. ORGANIC CHEMISTRY:—*M. C. Boswell.*

Departments 5 and 6, IV Year.

A laboratory course in advanced organic chemistry.

106. INDUSTRIAL CHEMISTRY:—*J. W. Bain.*

Departments 5 and 6, IV Year; 1 hour per week, both terms.

A lecture course on selected subjects in chemical technology.

107. INDUSTRIAL CHEMISTRY:—*J. W. Bain, E. G. R. Ardagh, M. C. Boswell.*

Departments 5 and 6, IV Year; about 28 hours per week, both terms.

A laboratory course in industrial problems.

108. ELECTROCHEMISTRY:—*J. T. Burt-Gerrans.*

Departments 5, 6, and 7, IV Year; 2 hours per week, both terms.

An advanced lecture course on the theory of solutions and electrolysis, and the application to the practice of electro-deposition and electrolytic refining of metals. The course also includes lectures on the electric furnace with special consideration of efficiency.

Text books:—Electrometallurgy—Borchers; Electrochemistry—Le Blanc; Electrochemistry—Luepke.

109. ELECTROCHEMISTRY:—*W. L. Miller and J. T. Burt-Gerrans.*

Departments 5, 6 and 7, IV Year; about 28 hours per week.

A laboratory course accompanying Course 108.

110. SANITARY AND FORENSIC CHEMISTRY:—*J. W. Bain.*

Department 5 and 6, IV Year; 1 hour per week, both terms.

A lecture course on the composition and examination of air, water and food; poisons and their detection.

111. SANITARY AND FORENSIC CHEMISTRY:—*J. W. Bain.*  
Departments 5 and 6, IV Year  
A laboratory course accompanying Course 110.
112. ANALYTICAL CHEMISTRY:—*E. G. R. Ardagh.*  
Department 2, IV Year, 12 hours per week, first term.  
A laboratory course comprising analysis of ores and furnace products.
113. SANITARY CHEMISTRY:—*E. G. R. Ardagh.*  
Department 1, IV Year.  
A lecture and laboratory course of about 6 hours per week on water supply, sewage disposal, ventilation, etc.

### **DESCRIPTIVE GEOMETRY AND DRAWING.**

115. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.*  
Departments 1, 2, 3, 6, 7 and 8, I Year; 1 hour per week; both terms.  
This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solutions of problems relating to straight lines and planes.
116. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.*  
Department 4, I Year; 1 hour per week; both terms.  
This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solution of problems relating to straight lines and planes, special reference being made to the determination of shades and shadows.
117. DRAWING:—*J. R. Cockburn.*  
Departments 1, 2, 3, 7 and 8, I Year; 11 hours per week, first term; 20 hours per week, second term.  
Copying from the flat, lettering, topography; graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; the plotting of original surveys; measured drawings.
118. DRAWING:—*J. R. Cockburn, H. H. Madill.*  
Department 4, I Year; 9 hours per week first term; 18 hours per week, second term.  
Copying from the flat, lettering, rendering the graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; measured drawings.  
Elements and principles of Architecture.
119. DRAWING:—*J. R. Cockburn.*  
Department 6, I Year; 4 hours per week, both terms.  
Copying from the flat, lettering, graphical solution of problems in statics, problems in descriptive geometry.

121. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.*

Departments 1, 2, 3, 7 and 8, II Year; 1 hour per week, both terms. This course of lectures is a continuation of the work taken in the first year with the following additions: Problems relating to curved surfaces, principles of shades, shadows and perspective.

122. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.*

Department 4, II Year; 1 hour per week, both terms.

This course of lectures is a continuation of the work taken in the First Year with the addition of problems relating to curved surfaces, shades, shadows and perspective.

123. DRAWING:—*J. R. Cockburn.*

Departments 1 and 2, II Year. Department 1, 6 hours per week, first term; 12 hours per week, second term. Department 2, 3 hours per week first term; 12 hours per week, second term.

Colouring and shading as applied to both topographical and construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics and strength of materials; measured drawings; elementary design.

124. DRAWING:—*J. R. Cockburn.*

Departments 3 and 7, II Year; Department 3, 14 hours per week, first term; 10 hours per week second term; Department 7, 12 hours per week, both terms.

Coloring and shading as applied to construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics, theory of mechanism and strength of materials; measured drawings; elementary design.

125. DRAWING:—*J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.*

Department 4, II Year; 17 hours per week, both terms.

Exercises from the orders of architecture; principles of shades, shadows and perspective; elementary architectural design; problems in descriptive geometry relating to solids bound by curved surfaces; solution of problems in optics and strength of materials; measured drawings.

126. DRAWING:—*J. R. Cockburn.*

Departments 6 and 8, II Year; 7 hours per week first term; 3 hours per week, second term.

(Same as Department 3 with the exception that Dept. 6 has no descriptive geometry.)

127. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn, W. J. Smither.*

Department 1, III Year; 1 hour per week, first term.

This course of lectures deals with spherical projections, the principles of mapmaking, and the graphical solution of spherical triangles.

128. DRAWING:—*J. R. Cockburn, C. R. Young.*

Department 1, III Year; 8 hours per week first term; 18 hours per week, second term.

Principles of mapmaking, spherical projection, plotting of original surveys relating to topographical and railway work; problems in theory of construction; original design of various structures; measured drawings.

129. DRAWING:—*J. R. Cockburn.*

Department 2, III Year; 7 hours per week first term; 2 hours per week, second term.

Plotting of original surveys, relating to topographical and railway work and mining; problems in theory of construction; original design; measured drawings.

130. DRAWING:—*J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.*

Department 4, III Year; 13 hours per week, first term; 22 hours per week, second term.

Architectural design; advanced work in monochrome and colours; problems in shades, shadows and perspective; problems in theory of construction, including framed structures.

131. DESCRIPTIVE GEOMETRY:—*J. R. Cockburn.*

Depart 4, III Year; 1 hour per week, first term.

Advanced work in shades, shadows and perspective.

132. DRAWING:—*J. R. Cockburn.*

Department 4, III Year; 1 hour per week, first term.

Advanced work in shades, shadows and perspective.

132. DRAWING:—*J. R. Cockburn, C. R. Young.*

Departments 3, 6 and 8, III Year; Department 3, 8 hours per week, first term; 2 hours per week, second term; Department 6, 3 hours per week, both terms; Department 8, 3 hours per week, first term.

Problems in design dealing with the theory of structures.

133. DRAWING:—*C. R. Young, W. J. Smith.*

Department, 1 IV Year; 17 hours per week, first term; 16 hours per week, second term.

Problems in structural design.

133a. DRAWING:—*C. R. Young, W. J. Smith.*

Department 1, IV Year; 6 hours per week, first term; 5 hours per week, second term.

Problems in structural design.

134. DRAWING:—*C. R. Young, W. J. Smith.*

Departments 3 and 4, IV Year; 3 hours per week, both terms.

Problems in mill building design.

134a. DRAWING:—*C. R. Young, W. J. Smither.*

Department 3, IV Year; 4 hours per week, first term; 6 hours per week, second term.

Problems in structural design.

**ELECTRICITY.**135. ELECTRICITY:—*H. W. Price.*

Departments 1, 2, 3, 6, 7 and 8, I Year; 2 hours per week, both terms. A course of lectures on basic principles relating to electric circuits, magnetic circuits, instruments and apparatus in general, distribution of electrical energy, etc., illustrated largely from commercial apparatus. The point of view of this work is quantitative rather than descriptive, for it is believed that men who can solve engineering problems are most likely to grasp underlying principles.

138. ELECTRICITY:—*W. S. Guest.*

Departments 3, 6 and 7, II Year; 2 hours per week, both terms.

Deals with the theory of electrical measurements, and detailed study of various methods applicable under different conditions in engineering practice to the measurement of resistance, current, potential difference, power and energy; calibration of commercial measuring instruments. The effect of choice of conditions of measurement on the accuracy of the result is considered.

139. ELECTRICAL LABORATORY:—*W. S. Guest.*

Departments 3, 6 and 7, II Year; 3 hours per week, both terms.

This laboratory course is closely associated with the lecture course 138 on electricity for the second year. The more important and useful methods of testing generators and circuits for electromotive force, resistance, current, grounds, etc., are practiced, often under conditions such as occur in practice. The work also includes methods of calibration of measuring instruments for voltage, current, power and energy, and certain studies of properties of incandescent lamps.

141. POWER:—*A. R. Zimmer.*

Departments 2, 6 and 8, IV Year; 21 hours.

Under the name "Power" a number of operating experiments are arranged to afford some familiarity with measuring instruments and direct and alternating current machinery.

142. MAGNETISM AND ELECTRICITY:—*T. R. Rosebrugh.*

Departments 3 and 7, III Year; 2 hours per week, both terms.

A course of lectures on theory of magnetism and magnetic circuits, theory of direct-current generators, motors, etc.

**143. ALTERNATING CURRENT:**—*T. R. Rosebrugh.*

Departments 3 and 7, III Year; 1 hour per week.

A first course of lectures on alternating current, covering principles of measurement and leading to the analytical and graphical treatment of the simpler problems relative to alternating-current circuits and machinery.

**144. ELECTRICAL LABORATORY:**—*A. R. Zimmer.*

Department 3, III Year;  $4\frac{1}{2}$  hours per week; Department 7, III Year; 6 hours per week.

This laboratory course is intended to afford the student an opportunity to become familiar with principles involved in continuous-current shunt, series and compound-wound generators and motors, and, to some extent, alternating-current circuits and machinery. Other sections of the work deal with the magnetic properties of iron and steel, and study of iron losses in transformers and generators.

The course is arranged to stand in close relation to the lecture courses in the subjects of magnetism and electricity and alternating current (142, 143) for III Year, and to certain design work (145).

**145. ELECTRICAL DESIGN:**—*H. W. Price.*

Department 7, III Year; 1 hour per week.

A course of lectures dealing with design of electrical apparatus and machinery, accompanied by designs to be worked out in the design room.

**146. ELECTRICAL DESIGN:**—*H. W. Price.*

Department 7, III Year; 3 hours per week

A design room is set apart for working out designs of electrical apparatus such as transformers, generators, motors, auxiliary apparatus, etc.

Special forms and notes are employed, arranged to suit the various studies. Certain models are provided to assist where necessary.

**147. APPLIED ELECTRICITY:**—*T. R. Rosebrugh.;*

Department 7, IV Year; 3 hours per week.

This course deals by analytical and vector methods with the theory of alternating-current circuits and machinery. Applications of theory are considered with regard to transformers, single and polyphase generators, synchronous motors and rotary converters, induction and commutating series motors, transmission lines, wave analysis, etc.

148. ELECTRICAL LABORATORY:—*A. R. Zimmer.*

Department 7, IV Year, in connection with 147; 20 hours per week. This laboratory course involves a thorough study of principles and properties of single and polyphase circuits and apparatus. Both vector and analytical methods are applied to the solution of problems based on tests made on laboratory machines.

The work deals mainly with constant-voltage and constant-current transformers, single and polyphase alternators, synchronous motors, rotary converters, induction and single phase commutating motors, transmission line, etc. The work does not consist only of factory tests, but is designed to lead the student to apply theory to practice as illustrated in the apparatus under test, with a view to an exact understanding of methods and an appreciation of limitations under many conditions. Free use is made of the oscillograph as a necessary device for "seeing" conditions under investigation. The best commercial measuring instruments are available.

**GEOLOGY.**150. GEOLOGY (Elementary):—*W. A. Parks.*

Department 2, II Year; Department 1, III Year; 1 hour per week, both terms.

This course deals chiefly with historical geology with special reference to Canadian formations.

Reference books:—Introduction to Geology—Scott; Text Book of Geology—Dana.

151. ECONOMIC GEOLOGY. (Including Dynamical and Structural Geology):—*A. P. Coleman.*

Department 2, III Year; 1 hour per week, first term; 2 hours per week, second term. Department 1, IV Year; 1 hour per week, both terms.

A study of the more important economic rocks, minerals and ores with their geological associations. Special attention paid to Canadian deposits.

152. ADVANCED GEOLOGY:—*A. P. Coleman.*

Department 2, IV Year; 2 hours per week, both terms.

(A) *Pre-Cambrian Geology.*—An account of the Keewatin, Huronian and Laurentian rocks of Canada, with their distribution, structural relations and economic features, and briefer accounts of similar formations in the United States and elsewhere.

Works of Reference:—Reports of the United States and Canadian Geological Surveys, of the Bureau of Mines of Ontario, etc.

- (B) *Pleistocene Geology*.—Lectures on the formation and distribution of the drift deposits of North America, with brief references to other regions. Glacial, Interglacial and Postglacial beds are described, changes of climate are discussed with their probable causes, and the economic features of the clays, sands and gravels are pointed out. A weekly excursion is made during October and November to points of interest near Toronto, which is the centre of the most important development of Pleistocene in America.
- (C) *Physiography*.—A course of lectures on the surface forms of the earth, with the geological factors which have produced them. The broad features of the earth, its plains, tablelands, hills, valleys, mountains, oceans, rivers and lakes are discussed in a general way, methods of topographical surveys and mapping are referred to, and the chief physiographic areas of Canada are described.

#### 153. MINING GEOLOGY:—*A. P. Coleman*.

Department 2, IV Year; 1 hour per week, both terms.

A course of lectures on geological problems associated with mining, typical mining regions in Canada, the United States and elsewhere being discussed from the geological side.

Works of reference:—Mineral Industry and the books mentioned under (A).

#### 154. GEOLOGICAL EXCURSIONS:—*A. P. Coleman*.

Department 2, IV Year.

Trips to points of interest in the vicinity of Toronto.

#### 155. ORE DEPOSITS:—*A. P. Coleman*.

Department 2, III Year; 1 hour per week, both terms.

Discussion of the origin and classification of ore deposits in a general way, the mode of occurrence of the chief metals, and statistics of production, special attention being given to the metals mined in Canada.

#### 156. ECONOMIC GEOLOGY:—*Alex. MacLean*.

Department 2, III Year; 2 hours per week, second term.

Laboratory work on ores, manner of occurrence, vein structure, etc  
Geological maps of typical mining regions.

## MINERALOGY.

#### 157. ELEMENTARY MINERALOGY:—*J. E. Thomson*.

Department 2, II Year; 2 lectures per week, first term.

After introducing the student to the chief chemical, physical, and crystallographic characteristics of minerals, the course becomes

descriptive and deals with about one hundred of the minerals most important from the industrial or scientific point of view.

Text Book:—Study of Minerals—Rogers.

158. MINERALOGY:—*J. E. Thomson.*

Department 6, I Year; 3 hours per week, one term.

Introduction to determination of minerals by inspection and physical tests.

Text Book:—Mineral Tables—Eakle.

159. PRIMARY MINERALOGY:—*A. L. Parsons.*

Department 1, II Year; 2 hours per week, first term.

A very brief introduction to the study of minerals and rocks.

Text books:—Study of Minerals—Rogers; Hand-Book of Rocks—Kemp.

160. MINERALOGY:—*A. L. Parsons, J. E. Thomson.*

Department 2, II Year; 1 hour per week, first term; 3 hours per week, second term.

Determination of minerals by inspection and by means of physical tests; introduction to blow-pipe practice.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

161. MINERALOGY:—*A. L. Parsons, J. E. Thomson.*

Department 1, II Year; 1 hour per week, first term; 2 hours per week, second term.

Determination of minerals by inspection and by means of physical tests; study of common rock types and their identification.

Text books:—Mineral Tables—Eakle; Handbook of Rocks—Kemp.

163. ELEMENTARY PETROGRAPHY:—*T. L. Walker.*

Department 2, III Year; 1 hour per week.

A course of lectures and laboratory work introducing the student to the macroscopic study of rocks.

Text-books:—Handbook of Rocks—Kemp.

164. MINERALOGY:—*J. E. Thomson.*

Department 2, III Year; 2 hours per week.

Determination of minerals by means of the blow-pipe and physical properties.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

165. GENERAL PETROGRAPHY:—*A. L. Parsons.*

Department 2, IV Year; 1 hour per week.

Study of the chief rock-forming minerals and of some phases of petrography not covered in the course of the previous year.

Text Books:—Minerals in Rock-Sections—Luquer; Petrology for Students—Harker.

166. PETROGRAPHY:—*T. L. Walker.*

Department 2, IV Year; 2 hours per week, both terms.

Study of the chief rock-forming minerals, of rocks in thin sections and in hand specimens.

Text books:—Rocks and Rock Minerals—Pirsson; Minerals in Rock Sections—Luquer.

169. MINERALOGY:—*A. L. Parsons.*

Department 8, II Year; 1 hour per week.

Determination of minerals by physical properties.

Text Book:—Mineral Tables—Eakle.

**MINING, ASSAYING AND ORE DRESSING.**170. MINING:—*H. E. T. Haultain.*

Department 2, II Year; 1 hour per week, first term. Department 8, II Year; 1 hour per week; both terms.

An introduction to the study of mining and ore dressing methods.

171. MINING AND ORE DRESSING:—*H. E. T. Haultain, F. C. Dyer.*

Departments 2 and 8, II Year; 3 hours per week, first term.

Introductory work with rock-drills and various ore dressing appliances.

172. MINING:—*H. E. T. Haultain, F. C. Dyer.*

Departments 2 and 8, III Year; 2 hours' lectures per week, second term; 3 hours' laboratory work per week, second term.

General mining methods.

173. ASSAYING:—*H. E. T. Haultain, J. T. King.*

Departments 2 and 8, III Year; 1 hour lecture per week, first term; 3 hours' laboratory work per week, both terms; Department 6, III Year; 3 hours' laboratory work per week, second term.

Assaying of various ores for gold, silver, lead and copper.

174. ASSAYING:—*H. E. T. Haultain, J. T. King.*

Departments 2 and 8, IV Year; 1 hour lecture per week, one term; 3 hours laboratory work per week, one term.

Continuation of the work of III Year.

175. MINING:—*H. E. T. Haultain.*

Department 2, IV Year; 1 hour lecture per week, both terms. Special mining methods, examinations, reports.

176. MILLING:—*H. E. T. Haultain, F. C. Dyer.*

Department 2, IV Year; 3 hours' laboratory work per week; both terms.

Advanced work with ore dressing appliances, complete mill tests.

177. ORE DRESSING:—*H. E. T. Haultain, F. C. Dyer.*

Departments 2 and 8, III Year; 1 hour per week; both terms.

179. ORE DRESSING:—*H. El T. Haultain, F. C. Dyer.*

Department 2, IV Year; 1 hour per week, both terms.

### METALLURGY.

180. METALLURGY:—*G. A. Guess.*

Departments 2, 5 and 6, IV Year; 1 hour per week, both terms.

The metallurgy of gold, silver, copper, lead, nickel, and zinc, metallurgical problems.

181. FERRO-METALLURGY:—*G. A. Guess.*

Departments 2, 6, 7 and 8, III Year; 1 hour per week, both terms.

The physical properties of iron and steel and the circumstances that influence the strength, etc., of iron. The different modes of manufacture of iron and steel and the effect of different processes of making on the resulting products; explanations of specifications for iron and steel adopted by engineers.

182. METALLURGY:—*G. A. Guess.*

Department 2, IV Year; 6 hours' laboratory work per week, second term.

Calibration of pyrometers, blast furnace smelting and copper converting, cyanidation, acid leaching of copper ores, electrolytic refining of lead and copper, electrometallurgy.

183. METALLURGY:—*G. A. Guess.*

Departments 2, 6 and 8, II Year; 1 hour per week, second term.

An introduction to the study of metallurgy.

184. METALLURGY:—*G. A. Guess.*

Departments 2 and 6, III Year; 1 hour per week; both terms.

Fuels, temperatures of combustion, Specific heat, conductivity and problems thereon. Chimneys, furnaces, refractories, outlines of furnace metallurgy and hydro-metallurgy.

185. METALLURGY:—*G. A. Guess.*

Department 8, II Year; 1 hour per week, both terms.

A lecture course in the study of metallurgical fuels, their use, preparation, calorific value and temperature of combustion. Problems.

186. METALLURGY:—*G. A. Guess.*

Department 8, III Year; 1 hour per week, first term.

Lecture course preparatory to study of metallurgical processes and methods.

Two hours' laboratory per week, first term.

Four hours per week, second term.

Lecture and class room work, metallurgical processes and methods.

Six hours laboratory per week, second term.

186a. METALLURGY:—*G. A. Guess.*

Department 8; IV Year; 2 hours per week, both terms, and 8 hours laboratory work, both terms.

Design and arrangement of plants. Metallurgical book keeping, balance sheets, thermal balance sheets. Refining processes. The metallography of iron and steel and non-ferrous alloys.

186b. PLANT DESIGN:—*G. A. Guess.*

Department 8, IV Year; 2 hours per week, both terms, during which is taken up a study of metallurgical flow sheets of typical plants. a critical reading and discussion of papers and articles describing metallurgical process or dealing with plant arrangement and construction; a consideration of some of the problems entering into general design of metallurgical plants.

**MATHEMATICS.**187. ALGEBRA:—*A. T. DeLury.*

Departments 1, 2, 3, 6, 7, 8, 1 Year; 2 hours per week, both terms.

Simple equations of one, two and three unknown quantities; quadratic equations of one and two unknown quantities; graphic representation of functions and the introduction of the gradient function; proportion and progressions; interest forms and annuities, permutations, combinations, limits, the general theory of infinite series, binomial theorem, exponential and logarithmic series.

Text book:—Intermediate Algebra—DeLury.

188. ANALYTICAL GEOMETRY:—*I. R. Pounder.*

All Departments, I Year; 1 hour per week, first term, 2 hours per week, second term.

The course in Elementary Analytical Geometry covers the more familiar propositions in connection with the straight line, circle, parabola, ellipse and hyperbola. The subject is treated so as to illustrate the general methods of analytical geometry.

189. TRIGONOMETRY, PLANE:—*M. A. Mackenzie.*

Departments 1, 2, 3, 6, 7, 8, I Year; 2 hours per week, first term.

Solutions of triangles and practical problems.

Text book:—Practical Trigonometry—Plane and Fawdry.

190. CALCULUS, DIFFERENTIAL AND INTEGRAL:—*S. Beatty.*

Departments 1, 2, 3, 4, 6, 7, and 8 II Year; 2 hours per week, both terms.

This is an elementary course in the infinitesimal calculus, but adequate to afford a knowledge of the character and methods of the subject and to enable students in chemistry, engineering, etc., to understand such of their text books as introduce the calculus.

## 70 UNIVERSITY OF TORONTO CALENDAR 1921-1922

### 191. TRIGONOMETRY, SPHERICAL:—*L. B. Stewart.*

Department 1, II Year; 1 hour per week, first term.

A course of lectures includes the derivation of formulæ and their application to the solution of triangles and to practical problems.

Text Book:—Spherical Trigonometry—Todhunter and Leatham.

### 192. LEAST SQUARES, METHOD OF:—*L. B. Stewart.*

Department 1, III Year; 1 hour per week, first term.

The course of lectures includes: The general principles of probability, the law of error, direct measurements of equal and different weights; mean square and probable errors; indirect measurements; conditioned observations; applications to empirical constants and formulæ, etc.

Text book:—Least Squares—Merriman.

## ENGINEERING PROBLEMS.

### 193. Departments 1, 2, 3, 6, 7, 8, I Year; 1 hour per week, both terms.

In this course the time is devoted to problem work involving an application of the theory and principles laid down in the lecture course of the various subjects of the First Year.

## TECHNICAL PHYSICS.

### 195. ACOUSTICS:—*G. R. Anderson.*

Department 4, III Year.

Wave motion, propagation, reflection and transmission of sounds.

Laws of vibrating strings, pipes and forks. Velocity of sounds.

Musical scales. Absorption of sound by various substances, use of deadening material in buildings. Amount of reverberation permissible and desirable in public buildings. Lectures and laboratory work.

### 196. HYDROSTATICS:—*G. R. Anderson.*

All Departments, II Year.

Laws of fluid pressure and application to machines. Dentsiy of solids and fluids, theory of flotation.

Lectures and laboratory work. Spring term.

### 197. OPTICS:—*G. R. Anderson.*

Departments 1, 2, 3, 6 and 7, II Year.

Rectilinear propagation of light, illumination, photometry, light standards. Distribution of light by reflectors and diffusers, general and selective absorption, economic values of artificial lights.

Laws of reflection and refraction, theory of optical instruments.

Light considered as wave motion, dispersion, spectrum analysis, colour phenomena, polarization.

Lectures and laboratory work, both terms.

198. HEAT:—*G. R. Anderson.*

Departments 1, and 8, III Year.

Generation and propagation of heat. General and industrial thermometry, calorimetry and pyrometry. Linear and cubical expansion, gas laws. Specific heat of solids, liquids and gases, latent heat of fusion and vaporization. Mechanical equivalent of heat. Carnot cycle.

Lecture and laboratory work, Fall term.

199. PHOTOGRAPHY:—*G. R. Anderson.*

Departments 1 and 4, III Year; Departments 3 and 7, IV Year.

The camera and its adjustments, lenses, shutters, screens. Plates for various purposes, films, prevention of halation. Lighting, exposure, development. Paper of various kinds, printing, enlargement and reduction, blue printing and allied processes. Record photography, photogrammetry and photo-surveying. Photography in colour.

Lectures Fall term, and laboratory work both terms.

200. ILLUMINATION:—*G. R. Anderson.*

Department 4, II Year.

Principles of interior and street illumination. Artificial lighting of public and private buildings, etc.

## **SURVEYING.**

205. SURVEYING:—*S. R. Crerar.*

Departments 1, 2, 3, 7 and 8, I Year; 1 hour per week, both terms.

The lecture course includes the general principles; surveying with the chain, the compass and chain and the transit and chain, and level, the applications of trigonometry to inaccessible heights and distances; mensuration of surfaces, co-ordinate surveying, division of land, etc.

Text books:—Plane Surveying—Tracy; Theory and Practice of Surveying—Johnston and Smith.

206. FIELD WORK:—*S. R. Crerar, E. W. Banting.*

Departments 1, 2, 3, 7 and 8, I Year; 5 hours per week, first term.

This course comprises testing chains; practice in chaining; a complete survey of a piece of land with the chain and transit; keeping of field notes; the use of the transit and compass in surveying closed figures and traverse lines and in ranging straight lines; plotting by latitudes and departures, and otherwise computing areas. Instrumental work with level.

207. SURVEYING:—*W. M. Treadgold, E. W. Banting.*

Departments 1 and 2, II Year; 1 hour per week, both terms.

This course of lectures takes up in detail, simple, reverse and compound curves as applied to railroad surveying. It also includes stadia, plane table and photographic surveying as applied to topographic work, and the main features of mine and hydrographic surveying.

Text books:—Henck, Searles, Allen (Field books for Engineers) Theory and Practice of Surveying—Johnston and Smith; Surveying—Breed and Hosner.

208. FIELD WORK:—*W. M. Treadgold, E. W. Banting, S. R. Crerar.*

Departments 1 and 2, II Year; 9 hours per week, first term.

This course of instruction embraces all adjustments of the transit and level, minor problems in triangulation and traversing—levelling and plane table practice.

209. SURVEYING AND LEVELLING:—*W. M. Treadgold, E. W. Banting.*

Department 1, III Year; 1 hour per week, both terms; Department 2, III Year; 1 hour per week, first term.

This course of lectures takes up the work of the railroad engineer on construction, including profiles, cross sectioning, computation of volume of earthwork, overhaul, transition curves, laying out turnouts, frogs and switches, etc.

Also a discussion of trigonometric and barometric levelling.

Text books:—Field Engineering—Searles; Railroad Curves and Earthworks—Allen.

210. FIELD WORK:—*W. M. Treadgold, E. W. Banting, S. R. Crerar.*

Departments 1 and 2, III Year.

This includes adjustments of levels and determination of profile, cross sectioning and computation of earthwork of located line on ground and plotting of same; also cross sectioning by use of hand level. A complete stadia topographic survey is made and plotted.

Micrometer work and plane table traverse are also taken up.

This work is to be taken at Gull Lake Camp (see page 21.)

**ADDITIONAL, FOURTH YEAR OPTIONS.**211. RAILWAY ENGINEERING:—*W. M. Treadgold.*

Department 1, IV Year; about 2 hours per week.

The object of this course is to make the student acquainted with the general principles of railroad and street railway engineering, and the subject will be studied from the standpoint of economic theory of location; train resistance; effect of grade, distance and curvature and rise and fall; maintenance of way; yards and terminals; tunnels, and street railway practice.

212. FIELD WORK:—*W. M. Treadgold.*

Department 1, IV Year; about 11 hours per week, first term.

The work consists of an original survey for a railroad some one or two miles in length, the work being conducted according to the most modern methods of location. Upon the completion of this work a contour map of the district surveyed is plotted in the drafting room and a line adjusted to it. This is staked out in the field, profiles taken and complete estimates of the cost of construction made.

## 213. SANITARY ENGINEERING.

*Sanitary Chemistry* (113).

*Biology* (63a).

*Hygiene and Bacteriology* (64).

*Re-inforced Concrete* (22).

*Hydraulics* (32c).

*Miscellaneous Structures* (24b).

*Sanitary Engineering:*—A lecture course of 1 hour per week, both terms, in which consideration is given to the problems of water supply and sewage disposal as viewed by the engineer. Some practice in the design of works from assumed data is afforded.

Reference books:—Public Water Supplies—Turneaure & Russell; American Sewerage Practice—Metcalf & Eddy, 3 vols.

## 214. HIGHWAY ENGINEERING:—

Department 1, IV Year.

A lecture and laboratory course of about 8 hours per week, dealing with materials, design and construction of highways and pavements and the testing of various materials used in such work.

## 215. STRUCTURAL ENGINEERING:—

Students in Civil Engineering who desire to specialize in the subjects best fitting them for designing or constructing engineers on bridge, building or other analogous work, may do so by selecting the Structural Engineering Option in the fourth year. In addition to the obligatory subjects, the following lecture and laboratory courses are provided for those selecting this option:

*Theory of Structures* (16).

*Strength and Elasticity of Materials* (17).

*Iron and Steel* (23).

*Reinforced Concrete* (22).

*Structural Design* (24).

*Mill Building Design* (24a).

*Miscellaneous Structures* (24b).

**216. ARCHITECTURAL ENGINEERING:—**

Architectural students desiring to give special attention to the structural design of buildings may do so by electing to take the Architectural Engineering Option in the fourth year. The following subjects, in addition to those required of all students in the fourth year in Architecture, are required:

*Mill Building Design (24a).*

*Architectural Design (48a).*

**MODERN LANGUAGES.****217. FRENCH:—*J. H. Cameron, Miss J. C. Laing.***

Required in Department 4, I Year; 2 hours per week, both terms;  
II year, 1 hour per week, both terms.

An elementary course intended to train the student in the translation  
of scientific journals and treatises.

**218. GERMAN:—*G. H. Needler.***

Required in Department 6, all years; 1 hour per week, both terms.

An elementary course intended to train the student in the translation  
of scientific journals and treatises.

**218a. SPANISH:—*M. A. Buchanan.***

Department 8, II Year; 1 hour per week, both terms.

An introduction to Spanish grammer, pronunciation and practice in  
reading Engineering Spanish.

**THESIS.****219. THESIS.**

Required in all Departments, IV Year, with the exception of Department 4, Architectural Design Option.

Each student is required to prepare a thesis of between six thousand  
and seven thousand words on a subject approved by Council.  
See circular of information.

**OUTLINE OF VACATION WORK.****220. CONSTRUCTION NOTES.**

II Year. See special circular of information.

The construction notes required consist of neat and complete dimensioned sketches in pencil of any structures, machines or plants which may be of interest. Any object chosen should be represented and dimensioned in such a manner that it could be completely constructed from the notes as the only available information.

From students in Department 2, who have been actually engaged during the summer with Government or other approved geological survey parties, geological field notes will be accepted in lieu of construction notes.

### MASTER OF APPLIED SCIENCE DEGREE.

1. A candidate for the degree of Master of Applied Science (M.A.Sc.) shall hold the degree of Bachelor of Applied Science (B.A.Sc.) of this University.
2. He shall spend not less than one academic year in attendance as a student, in the Faculty of Applied Science, on a course of study approved by the Council.
3. He shall present a satisfactory thesis on a subject approved by the Council.
4. He shall pass such examinations as the Council may decide.
5. The candidate must register at the beginning of the academic year.

### PROFESSIONAL DEGREES.

The attention of graduates is directed to the following regulations respecting professional degrees.

The following degrees have been established: Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem.E.), subject to the following regulations:

1. A candidate for one of the said degrees shall hold the diploma of the School of Practical Science or of the Faculty of Applied Science and Engineering or the degree of Bachelor of Applied Science.
2. He shall have spent at least three years after receiving the diploma or the degree in the actual practice of the branch of engineering wherein he is a candidate for a degree.
3. Intervals of non-employment or of employment in other branches of engineering shall not be included in the above three years. It shall not be necessary that the several periods requisite to make up the said three years be consecutive.
4. Satisfactory evidence shall be submitted to the University examiners as to the nature and length of the candidate's professional experience for the purpose of clauses 2 and 3.

The Examiners shall satisfy themselves by oral or written examinations in regard to the candidate's experience and competence.

5. The candidate shall prepare an original thesis on some engineering subject in the branch in which he wishes a degree, the said thesis to be accompanied by all necessary descriptions, details, drawings, bills of quantities, specifications and estimates.  
The candidates may be required at the option of the Examiners to undergo an examination in the subject of this thesis.
6. Notice in writing shall be sent to the Secretary not later than the first day of February, informing him of the degree to which the candidate wishes to proceed and of the title of his proposed thesis for the approval of the Examiners.
7. The evidence under clause 4, and the thesis, with accompanying papers, described in clause 5, shall be sent to the Secretary not later than the first day of April.
8. The candidate shall be required to present himself for examination in the month of April at such time as may be arranged by the Examiners.
9. The fee for any one of the said degrees shall be twenty dollars, and shall be paid to the Bursar not later than the first day of April.
10. The thesis, drawings, and other papers submitted under clause 7 shall become the property of the University.

## LABORATORY EQUIPMENT.

### THERMODYNAMIC AND MECHANICAL LABORATORY.

The University in 1919 completed the erection of a large, well-equipped building for the accommodation of the steam, gas, mechanical and hydraulic laboratories. A more complete description of the laboratories has been published elsewhere, so that the present description is only intended to give the main features.

The part of the building set apart for thermodynamics and other mechanical work is the ground floor of a room 60 ft. x 155 ft. This room is lighted entirely from the roof in a very perfect way. A part of the space 40 ft. wide running the entire length of 155 feet is served by a 3 ton travelling crane and contains the following equipment:

50 h.p. Brown engine with separate jackets on both heads and barrel of cylinder.

Two-stage Rand air compressor having compound steam cylinders, each fitted with Meyer cut-off gear. The low pressure air cylinder has Corliss inlet gear.

30 h.p. high-speed Leonard tandem compound engine with shaft governor.

15 h.p. high-speed McEwan engine.

75 h.p. two-line compound Willans engine.

15 h.p. DeLaval turbine with special nozzles for condensing and non-condensing tests.

Two 15 h.p. Leonard engines with different types of valves, which are used for valve setting.

There are also two surface condensers with air pumps so arranged that any engine in the laboratory may be made to exhaust into the atmosphere through an open heater or into one of the condensers, the change from one arrangement to the other being accomplished in a few minutes without the aid of valves.

The laboratory further contains:

A 3 ton York refrigerating machine with tanks.

An Amsler transmission dynamometer.

Apparatus for testing injectors and steam pumps.

Numerous other pieces of apparatus and instruments.

The work on internal combustion engines and producers is performed on the following:

- 18 h.p. Canada suction gas producer.
- 14 h.p. National gas engine arranged for various compressions and points of ignition.
- 10 h.p. Fielding and Platt engine for city gas or coal oil, having various adjustments.

- 8 h.p. Otto gas engine.
- 6 h.p. marine gasoline engine.
- Various accessories to above machines.

Steam for the laboratory is supplied by two 50 h.p. and one 100 h.p. Babcock and Wilcox boilers, the latter having an internal superheater. These boilers are located in a separate boiler room. They are used for experimental work only and are fitted up for testing. The gases pass up through two independent chimneys, and these have been arranged so that the draft and other conditions in the chimney at any point of its height may be examined.

In smaller work-rooms off the main laboratory are placed belt and oil testing machines, apparatus for testing the efficiency of gears and machines, and for experiments in the balancing of machinery.

### **HYDRAULIC LABORATORY.**

The hydraulic laboratory occupies two floors each 40 feet x 112 feet, which are well lighted by large windows on the side and end.

The water for the experimental work is pumped through the various pieces of apparatus from a well by means of two turbine pumping units, both of which are driven by a Belliss and Morcom compound engine of 125 h.p. running at a speed of 525 revs. per minute. Both engine and pumps have been installed with a view to using them in experimental work as well as for supply of water for other apparatus used in the laboratory.

The pumping units are capable of delivering one cubic foot of water per second against heads of 250 feet and 300 feet respectively. These units are designed and connected up so that they may be run in series giving the above discharge at 550 feet head, or they may be run in parallel giving double the discharge at a lower head. Each pumping unit consists of two two-stage pumps mounted on a common base and driven by a single pulley, and the construction and piping are such that each two-stage pump may be driven separately or that all may be driven at once, discharging separately one cubic foot per second at about 125 feet head through each of four independent pipes, or else the pumps may be run in series or in parallel. The scheme is thus well adapted to laboratory work, and under the heads used on reaction turbines about six cubic feet per second may be obtained.

The laboratory further contains a large vertical steel tank  $5\frac{1}{2}$  feet diameter by 34 feet with arrangements for the attachment of nozzles and other mouthpieces, etc. Connections are also arranged for reaction turbines, the tank acting as a reservoir.

The discharge from the turbines or nozzles is measured in a weir tank nearly 6 feet wide and 21 feet long, containing a contracted weir  $4\frac{1}{2}$  feet wide. This weir may be calibrated by two weighing tanks, each having a capacity of about 240 cubic feet.

There are three reaction turbines and two impulse wheels all ready for experiment, the power being measured by brakes and the water by weir or orifices. Amongst the reaction turbines may be mentioned the one designed and built by Escher Wyss & Co., specially for the laboratory.

Smaller orifice and weir tanks, each about  $3 \times 3 \times 12$  feet with necessary measuring tanks, are arranged for instruction in coefficients of various kinds and practice with weirs and orifices.

A Venturi meter and other meters, also a hydraulic ram and similar devices are available for testing, and good facilities have been arranged for investigating friction and other properties of pipes and fire hose.

For special investigations on turbine and centrifugal pumps, other pumps in addition to those already described have been arranged.

The basement of the laboratory contains an open trough 5 feet wide, about 110 feet long, with a large weir at one end. It is intended to use this trough for experiments on the flow in open channels, for measurements of large discharges by means of the weir, and for experiments with current meters and Pitot tubes.

Numerous pieces of smaller apparatus, together with all instruments required, have also been provided, and the laboratory equipment is believed to be very complete.

#### **AERONAUTIC EQUIPMENT.**

For the purpose of the scientific study of problems connected with aviation and the best design of aeroplanes, and also of all problems connected with the effect of wind pressure, a wind tunnel 4 ft. square has been installed in the Hydraulic Laboratory and equipped with the latest form of balance and all the necessary instruments.

There are available for laboratory demonstration and instruction purposes the following aeroplanes:—one S.E. 5A, one Avro Training and two J.N. 4 Curtis Training, all the gift of the Royal Air Force.

The laboratory also contains a number of aeroplane engines of most modern type, both rotary and stationary, and a number of models; and also a complete Hispano Suiza aeroplane. These machines are available for inspection, and are of much help in studying the trend of development and design in the power plant of lightest weight.

**DONATIONS TO THE THERMODYNAMIC AND HYDRAULIC LABORATORIES.**

The following donations to the equipment of the laboratories have been made through the kindness of those mentioned:

50 h.p. Wheeler Surface Condenser, presented by Mr. F. M. Wheeler, New York.

Blake Feed Pump, presented by the manufacturers.

6-inch New American Turbine, presented by Wm. Kennedy & Sons, Owen Sound, Ont.

Two Crown Water Meters, presented by the National Meter Co., New York, through Mr. M. Warnock, Toronto.

Rock Drill, presented by Sullivan Machinery Co., New York, through Mr. A. E. Blackwood, '95.

Marine Gasoline Engine, presented by Canadian Fairbanks Co., Montreal.

Two engines with different types of valve, presented by Messrs. E. Leonard & Sons, London, Ont.

Bundy trap from American Radiator Co., through Messrs. Russell & Gifford.

Dunham steam trap from C. A. Dunham Co.

Sectional models of valves from American Radiator Co.

Sectional model Mason Reducing Valve by Russell & Gifford.

Tanks, etc., by John Inglis Co.

Pressure Fan from Sheldons Ltd., Galt.

Model water turbine test runner from Wellman, Seaver Morgan Co., Cleveland, O.

In addition to the above, other firms have materially assisted by offering apparatus at or below cost price, among whom may be specially mentioned, The Canadian Rand Drill Co., Sherbrooke, Quebec.

The following machines are gifts from the Royal Air Force:

Liberty Aeroplane Motor 400 h.p.

200 B. h.p. Siddeley Deasey Aero Engine.

120 h.p. Beardmore Aero Engine.

Curtis Engine (Sectional).

Hispano Suiza Aero Engine.

80 h.p. Le Rhone Rotary Engine.

Clerget Rotary Engine.

Gnome Monosoupape Engine.

Admiralty Rotary Engine 150 h.p.

Hispano Suiza Aeroplane.

Models of Engines, etc., and numerous spare parts.

### **PHYSICAL LABORATORIES.**

The optical laboratory is equipped with Weinhold optical benches and accessories for determining the constants of mirrors and lenses and for demonstrating the construction and use of telescopes, field glasses, microscopes, etc. There is also an equipment consisting of one or more of the following optical instruments:—field glasses, microscopes, reading telescope, small comparators, spectrometer, various types of photometer, small focometer, cathetometer, polariscope, illuminometer, standard gas light testing bench, precision electric light, photometry bench, projecting lanterns, etc.

The photographic laboratory is supplied with a number of hand cameras for the use of students. There are also larger cameras for Departmental work, copying cameras, engraving lanterns and a kinematograph camera, printer and projector, electric blue-printing machine and the necessary dark rooms, complete equipment for photographic survey.

The hydrostatic laboratory contains a supply of various forms of hydrometers, hydrostatic balance, Jolly balance, Mohr's balance, hydrostatic press, vacuum pumps.

The heat laboratory is equipped with a full supply of calorimeters and accessories for determinations of latent and specific heat, expansion apparatus, air thermometer, apparatus for verification of Boyle's law and pressure and boiling point curve, and for determination of the absolute expansion of mercury, Callendar's apparatus for determination of the mechanical equivalent of heat. Calorimeter for the determination of the value of solid, liquid, and gaseous fuels.

The acoustical laboratory is provided with sonometer, siren, forks ordinary and electric, Lissajous' and Melde's apparatus, organ pipes of various forms, manometric flame apparatus and a special equipment for work in architectural acoustics consisting of torsion chronograph, electropneumatic wind chest and standardized organ pipes and other accessories.

### **ELECTRICAL LABORATORIES.**

New building.—At present the electrical laboratories are as described below. By October, 1921, however, the laboratory equipment will have been moved into the new building now ready for occupation. The new quarters will be found to be much more commodious and better lighted, as well as fireproof. There will be study rooms, a room for electrical design, three large main laboratories, and several rooms for special purposes such as high tension work, magnetic testing and electrical properties of conductors and insulators. There will be a shop, also excellent elevator facilities for moving equipment.

Instrument laboratory.—The equipment of this laboratory is, in part, as follows: A set of D'Arsonval galvanometers conveniently located at tables about the laboratory, a set of resistance boxes for use with the same; measuring instruments, including ammeters, voltmeters, wattmeters,

potentiometers and standard cells. Apparatus for the measurement of low resistance, including a ductor, and for high resistance, including a megger; several Carey Foster outfits and a Roller bond tester. There are also experimental lines for practice in locating faults, photometer outfits with rotating devices and various types of arc lamps.

Another room is fitted more especially for calibration of electrical instruments for alternating and direct currents. About one hundred and twenty portable measuring instruments are available for students' use, also standard instruments, including Weston laboratory standards, and a Wolff potentiometer, with which the portable instruments may be compared.

Machine laboratory.—This laboratory, occupying two large rooms, contains twenty-five dynamos and motors varying in capacity from two to twenty kilowatts, adapted for experiments illustrating the properties of compound, shunt and series dynamos and motors, arc machines, as well as the use of interpoles. Switch-boards, numerous rheostats, lamp racks, starting boxes, circuit breakers, flexible cables, brakes, torsion dynamometers, tachometers, etc., are available for use with the machines.

This laboratory also contains two 15 kw., 25 cycle and two special 15 kw., 60 cycle General Electric polyphase revolving field alternators direct driven by motors, two  $7\frac{1}{2}$  kw. alternators, two rotary converters of 10 kw. and 5 kw. capacity, a  $7\frac{1}{2}$  kw. General Electric polyphase induction motor with slip ring rotor, Westinghouse three-phase squirrel cage induction motors, Wagner single phase motor and unity power factor motor, Swedish General Electric variable speed motor, Westinghouse single phase series motor, Westinghouse alternator, and several three phase and single phase induction motors; also transformers, reactive coils, and other details, as in the direct current sections of the laboratory described above, for experiments on the properties of alternating currents and alternating current apparatus in general. A constant-current transformer with its load of six series arc lamps, a three-element oscillograph, for studying wave forms, a high potential transformer and a mercury arc rectifier may also be mentioned. The students are supplied with Weston, Westinghouse and Thomson portable instruments for measuring purposes.

A motor generator set has been installed, comprising a 65 h.p. motor driving on the same shaft a 30 kw. 110 volt d.c. generator and a 30 kw. 60 cycle 110 volt alternator with direct connected exciter.

Appliances are also provided for the study of saturation and hysteretic properties of samples of iron and steel, and models for exercise in winding armatures.

High tension room. In a separate room with proper automatic devices for safety to the operator, there is installed a 20 kv-a. transformer with a range of voltages up to 200,000 volts. Studies of insulators may be carried out.

### CHEMICAL LABORATORIES.

The Chemical laboratories are situated in the western half of the Chemistry and Mining building, on the first and second floors. The rooms are large and well lighted, and are supplied with the usual modern equipment.

The first and second year laboratory for qualitative work has accommodation for 112 students, each working space being supplied with water, gas and fume cupboard. The laboratory for quantitative analysis will accommodate 48 students, and is supplied with commodious fume cupboards and all necessary apparatus. A laboratory with working places for 36 is provided for the students engaged in the study of technical chemistry; it is equipped with appliances for the preparation and testing of chemical products. A laboratory for fourth year students with accommodation for eight workers has been fitted up. Each of these laboratories has its own balance room adjoining furnished with instruments from the best makers and adapted to the particular objects in view.

In addition there are rooms set apart for gas analysis, electrolytic analysis and a specially constructed fireproof laboratory for combustion, crucible and bomb furnaces. A calorimeter room has been equipped in the basement. Each of these laboratories is supplied with apparatus of the most approved design, providing excellent facilities for the prosecution of work in analytical and technical chemistry.

### ELECTROCHEMICAL LABORATORIES.

The Electrochemical laboratories, which are situated in the Chemistry and Mining building, are provided with special facilities for electrolytic work, including a large storage battery and electroplating dynamo with tanks as well as a good set of apparatus and electrical measuring instruments. The experimental work on electric furnaces is performed in two rooms specially equipped for this purpose with rheostats and switchboard connections to a 120 kw. d.c. generator which supplies the current required.

### ASSAYING LABORATORIES.

Two Assaying laboratories are situated in the basement of the Chemistry and Mining building. One has a floor space of 17 feet x 47 feet, and the other 28 feet x 37 feet. Adjoining each is a room 15 feet x 11 feet, with the necessary equipment for the wet work in connection with assaying. Common to both laboratories is a balance room furnished with gold balances set on a concrete pier. Each of the laboratories contains a number of melting holes for crucible fusions, various gas and oil furnaces both for crucibles and muffles, and two large brick muffle furnaces.

The furniture comprises lockers for the students, tables for the pulp balances and the necessary cabinets and shelving.

Adjoining the assay laboratories is a preparation room (19 feet x 13 feet) which is equipped with a motor, crusher, pulverizer, sample grinder and all the necessary hand pulverizers, screens, etc., for preparing ores for assay.

**METALLURGICAL LABORATORY.**

This laboratory is on the basement floor of the Chemistry and Mining Building. The main room has a floor space of 1,600 square feet.

Among the larger furnaces included in the equipment of the laboratory are a six hearth Wedge mechanical roasting furnace, the gases from which pass through Cottrell precipitating pipes 12 inches in diameter, and which are served with rectified current at 50,000 volts. There is also a gas fired muffle roasting furnace, a Steele-Harvey tilting furnace, a large resistance furnace for high temperature work, two water jacketed blast furnaces and a copper converter.

The laboratory has several small furnaces of various types. Facilities are provided for pyrometric work, for zinc retorting, for furnace gas analysis, for leaching of ores and for the electrolytic refining and precipitation of metals.

There is a laboratory for the testing of clays equipped with grinding pan, ball mill, presses, gas fired and oil fired kilns.

The metallographic laboratory is equipped with power driven polishing tables and microscope with metallographic camera.

**MILLING AND CONCENTRATING LABORATORY.**

A detached building, 72 feet x 70 feet in area, contains the milling and concentrating equipment. It is heated, lighted and supplied with electric power from the central plant, and is divided into two parts. The greater part, with 72 feet x 53 feet floor space, and 22 feet high, contains the milling and concentrating equipment. The machinery for the former operations consists of a five-stamp battery erected on concrete foundations, Challenge ore feeder, amalgamating plates, Wilfley table, a clean-up pan, steel settling tanks, a steel tank suspended from the roof girders to furnish a constant supply of water, and a track with travelling crawl to transport ore. This is driven by a 15-horsepower motor.

The concentrating part consists of a set of five revolving trommels for wet screenings, four three-compartment jigs, a trough classifier delivering three products, and two revolving buddles, Wilfley Slimer, Deister Slimer, Richard's Pulsating Classifier, Richard's Pulsating Jig, a dry sizer, besides experimental apparatus of various kinds for experimenting on the falling rates of ore particles, the settling of slimes, surface tension action in oil and flotation methods, etc. The waste products run to the same settling tanks as the tailings from the stamp battery. The ore is handled by a travelling crawl. All the machinery in this part is driven by electric motors.

The lower floor has been fitted up for lixiviation work with apparatus for the treatment of sands and slimes, different types of filter press, vacuum plant agitators, etc.

The plant throughout is intended mainly for teaching and experimental purposes and is made of such a size that numerous experiments can be carried out on small quantities of ore. Tests can also be made on lots of one to ten tons.

The other part of the milling building with 72 feet x 17 feet floor space and 15 feet high is divided into four separate rooms. The largest of the four rooms has an area of 476 square feet and is devoted to the crushing and pulverizing of the ores preparatory to their treatment in the milling and concentrating room. It is isolated in order to confine the dusty operations as far as possible to this one room, and is equipped with a gyrating crusher of Hadfield's make, a set of Hamilton rolls 16 inches by 12 inches, platform scales for weighing ore, a jib crane, pulleys, buckets, etc., for handling the rock. An adjoining room contains a 30 h.p. motor for driving the machinery of the crushing department, and storage bins for ore, work bench, etc. Another room with 17 feet x 15 feet floor space is furnished with a magnetic separator of the Rowan-Wetherill type, driven by its own motor.

### MECHANICS OF MATERIALS LABORATORY.

This laboratory is intended for the scientific and commercial testing of materials of construction such as iron, steel, timber, concrete and masonry.

It is supplied with the following:

An Emery 50-ton hydraulic machine, built by Wm. Sellers & Co., of Philadelphia, for making tests in tension and compression.

A 100-ton screw power machine, built by Riehle Bros., Philadelphia. It is designed for making tests in tension, compression, shearing and cross-breaking, and will take in posts 12 feet long and beams up to 18 feet in length.

A Riehle 10-ton screw power universal testing machine.

A Riehle 50-ton screw power universal testing machine.

A 15-ton single lever-machine, built by J. Buckton & Co., Leeds, England.

A torsion machine, built by Tinius Olsen & Co., Philadelphia, for testing the strength and elasticity of shafting. This machine will twist shafts up to 16 feet in length and 2 inches in diameter.

A hand power torsion machine of simple mechanical construction, specially designed for the testing of short shafts of a maximum diameter of one inch.

A Riehle transverse testing machine of 5,000 pounds capacity, adapted to specimens up to 48 inches in length.

A Riehle compressometer, with spherical seat attachment for the adjustment of specimens having slightly non-parallel faces. This compressometer will receive specimens up to 10 inches in length.

An Olsen compression micrometer of standard type.

A 20,000 pound Olsen, hand power, wire testing machine, specially fitted for testing wooden columns with both fixed and pivoted ends.

A Riehle abrasion cylinder, built to the standard required by the National Brickmaker's Association, adopted in 1901.

A Berry strain-gauge for spans of 3 inches and 8 inches.

A Nalder dividing engine. This may be used either for the precise division of scales or for the calibration of instruments intended for refined measurements.

A Brinell hardness testing machine.

A Shore scleroscope for testing hardness.

A large number of extensometers of the usual degree of precision. These include the Bauschinger, Martens, Unwin, Ames, Riehle, Johnson, Henning (recording) and other types. In addition there are the usual scales, micrometers, telescopes and reflectors, voltmeters for the determination of metallic contact, and such other appliances as are necessary in the making of precise measurements.

The shop is equipped with a number of high-class machine tools specially fitted for reducing the specimens to the requisite shapes and dimensions with a minimum of hand labour. It is also supplied with the necessary appliances for making ordinary repairs and for making apparatus for special experiment and original investigation.

### HIGHWAY LABORATORY.

This laboratory is equipped for carrying out investigations in the various materials employed in highway construction and maintenance, and comprises the following:

Page impact machine for testing the toughness of road materials.

Diamond core drill for preparing specimens for the toughness test.

Deval abrasion machine for testing the resistance to wear of road materials.

Cementation testing apparatus (Page type) for determining cementing properties of road materials.

Jaw crusher (Mitchell type) for crushing rock for various tests.

Power driven agitator with sieves for the mechanical analysis of sand, gravel and crushed rock.

The laboratory is also equipped with the appliances necessary for examining physical properties:—volatilization, specific gravity, viscosity, melting point, penetration, ductility, etc., of oils, asphalts, tars and other bituminous mixtures used in road construction and maintenance.

### LABORATORY OF ONTARIO BOARD OF HEALTH.

Through the courtesy of the Secretary of the Provincial Board of Health for Ontario the facilities of the excellently equipped laboratory which the Board maintains at Stanley Park have, with certain conditions, been placed at the service of the University for the investigation of problems of interest to the sanitarian and the sanitary engineer. The equipment consists of various types of sewage sedimentation tank, sewage filter, sewage measuring

devices, aerators, sterilizing appliances and a complete and representative plant intended for the filtration and sterilization of water by practically all known methods.

### **CEMENT TESTING LABORATORY.**

This laboratory is fitted with all the ordinary moulds, sieves, balances, burettes, steaming and drying tanks, tables, and other appliances necessary in making the usual physical tests of a Portland cement. It is also supplied with completely equipped cabinets for individual work. In addition there are the following:

- A 2,000 lb. Riehle machine fitted for either tension or compression.
- A 2,000 lb. Riehle shot machine for tension.
- A 2,000 lb. Fairbanks shot machine for tension.
- A 1,000 lb. Olsen automatic shot machine fitted for tests in either tension or cross breaking.
- An Olsen soapstone moist closet of modern design.

### **METROLOGICAL LABORATORY.**

The department of surveying and geodesy is provided with all the ordinary field instruments, such as transits, levels, compasses, micrometers, sextants, planimeters, plane tables, tapes, chains, etc., with which is carried on the instruction in practical field operations as detailed elsewhere.

A small laboratory is also established in the basement of the observatory described below, containing the necessary instruments for the refined measurements of geodetic surveying; as, a standard yard and metre, a Rogers 10-foot comparator, an invar base measuring apparatus, a Kater's pendulum with vacuum chamber, a level trier, micrometer microscopes, etc.

The geodetic observatory in connection with this department is used for the instruction of students of the Fourth Year in taking observations for time, latitude, longitude, and azimuth by the precise methods used in connection with a geodetic survey. It contains a 10-inch theodolite and zenith telescope by Troughton & Simms; an astronomical transit instrument and an 8-inch theodolite by Cooke; two electro-chronographs; a Howard astronomical clock; a Dent sidereal clock; a Dent sidereal break-circuit chronometer; a wireless receiving instrument; arithmometers, etc.

### **GEOLOGICAL AND MINERALOGICAL LABORATORIES.**

In the Chemistry and Mining building on College Street the University possesses a modern laboratory for Geology and Mineralogy.

Courses are given in laboratory work, especially in personal examination of type sets of rocks, fossils, minerals and crystal models. These laboratory exercises serve to illustrate the introductory didactic instruction.

For the encouragement of pure crystallography the laboratories are supplied with goniometers of the various types, crystal models, appliances for the cutting of oriental crystal sections and for the physical examination of the same. Practical petrography is carried on in rooms provided with type sets of rocks, both macroscopic and microscopic. Advanced students are taught to make thin sections of rocks and fossils and to study them microscopically. For students in Mining a laboratory course in the interpretation of geological maps and sections is provided. Typical mining regions are studied in detail and an opportunity is afforded for the examination of specimens illustrating economic geology.

The laboratory for the preparation of thin sections of rocks, minerals and fossils is provided with electric diamond saws and grinding appliances for the various types of work incidental to the preparation of thin sections and museum material.

A room is also provided for advanced work in cartography and geological surveying.

The departments possess 28 petrological microscopes and 5 of other types, so that it is now possible to provide advanced students with instruments and sets of thin sections for their own especial use. The blowpipe laboratory contains 156 lockers, especially designed for apparatus for students.

#### School of Engineering Research.

A School of Engineering Research, within the Faculty of Applied Science and Engineering was established in the Spring of 1917 at the suggestion of the late Dean Ellis.

The School is under the direct supervision of a Committee of Management composed of fifteen Members of the Faculty Council. To this Committee is entrusted the selection of researches to be undertaken under the auspices of the School, and the disposition of funds conducting them.

The School was organized chiefly for the training of graduates in methods of research, and for the carrying out of investigations. These latter may be problems relating to specific industries or raw materials and having a specific end in view, or general problems having to do with fundamental principles.

A number of research assistants are appointed annually in the various departments of the Faculty to carry on the work of research under direction of members of the staff. The facilities of the School are also open to graduates who desire to penetrate more deeply into particular phases of experimental work, or to undertake investigations either suggested by members of the staff or arising from their own work since graduation.

Address communications to the Secretary—Professor Maitland Boswell.

**LIBRARY.**

The University Library is contained in a building of its own, situated on the east side of the campus, that lies to the south of the Main Building. All students who have paid a library fee to the Bursar of the University are entitled to the privileges of the Library. Besides Reading Rooms the Building contains Departmental Studies, which may be used as study-rooms by honour students in the various branches and in which the Professors hold seminary courses, and private studies, intended for members of the Faculty or advanced students engaged in research work. The Library is opened at 8.45 every morning and remains open until 5.15 in the afternoon (6 p.m. during the second term). Books in ordinary use may not be taken out of the building during the daytime, but are lent for the night shortly before the hour of closing, to be returned the following morning before 10 o'clock. Books not in general demand may, on special application, be borrowed for a longer period. Failure to return a borrowed book at the proper time and other breaches of the regulations are punishable by fine or suspension from the privileges of the Library.

Rooms have been set apart in the Engineering and the Chemistry and Mining buildings for the housing of such periodicals and other literature of the University Library as is of special interest to the students of this faculty.

**ROYAL ONTARIO MUSEUM.****Archaeology, Geology, Mineralogy, Palaeontology, Zoology.**

Students of the University in all departments are recommended to avail themselves of the privileges of the Museum, which, although under separate control, is intimately connected with the work of the University. The Museum is open on all week days from 10 a.m. to 5 p.m., and on Sundays from 2 p.m. to 5 p.m. The admission is free to the public on Tuesday, Thursday, Saturday and Sunday. On other days an admission fee of fifteen cents is charged.

By a resolution of the Board of Trustees all regular students of the University may be admitted free on all days of the week by presenting their card of registration.

**UNIVERSITY OF TORONTO C.O.T.C.**

The Toronto Contingent of the Canadian Officers Training Corps was organized in 1914, with a strength of 12 Companies. Its primary object is to provide students at Universities with a standardized measure of military training with a view to their qualifying for commissions in the country's auxiliary forces. C.O.T.C. Certificates of qualification exempt their holders from examination for commissioned rank on joining a militia

unit. The facilities which are offered by the contingent for obtaining a qualification while at the University, are intended to enable gentlemen to give personal service to their country with the least possible interference with their civil careers, to ensure that units have their establishments complete in the junior commissioned ranks, and to build up an adequate reserve of scientifically trained officers who have completed a period of consecutive and systematic military training, on academic lines, of a nature calculated to produce good officers.

The contingent provides the practical work for students taking the Military Studies option for the B.A.Sc. degree, (see p. 19) as also physical exercise for students who may choose this as the form in which they will take their compulsory Physical Training. In addition to service in the corps for a University credit, students of any year or Faculty are trained in it to qualify for the Militia Department's officers' certificates. As the corps develops, after the set-back subsequent to its continuous activities during the war, it is hoped that it may be possible to form companies according to faculties and to so arrange the training of each that on leaving the University students will be qualified for commissions in that branch of the Militia to which their University course particularly applied.

The C.O.T.C. is a unit of the non-permanent Active Militia but forms no part of the organization for war and cannot be called out for active service as such. It is a training centre for the educated youth of the country from whom, as from all its sons, the Empire requires hard service but the hardest from those to whom most has been given.

The present Headquarters are at 184 College Street, and include armouries, members' reading room, library, and lecture room.

The Contingent's Staff is:

<i>Officer Commanding</i> .....	Colonel W. R. Lang, late Gen. Staff, C.E.F.
<i>Second in Command</i> .....	Major T. R. Loudon, late Can. Eng., C.E.F.
<i>Adjutant</i> .....	Major H. H. Madill, late C.E.F.
<i>Quartermaster</i> .....	Lieut. V. C. Kerrison, late C.A.S.C., C.E.F.
<i>Paymaster</i> .....	Lieut. T. A. Reed
<i>Musketry Officer</i> .....	
<i>Contingent Sergeant-Major</i> ....	S.-M. W. Hunt, late Royal Welsh Fusiliers.

## SOCIETIES.

---

### THE ENGINEERING SOCIETY OF THE UNIVERSITY OF TORONTO.

---

#### Officers for 1920-1921.

<i>President</i> . . . . .	R. W. Downie
<i>Vice-President</i> . . . . .	K. L. Carruthers
<i>Treasurer</i> . . . . .	J. A. Langford
<i>Corresponding Secretary</i> . . . . .	B. H. Miller
<i>Recording Secretary</i> . . . . .	J. Farley
<i>Curator</i> . . . . .	W. E. Bennett
<i>Fourth Year President</i> . . . . .	J. R. McLean
<i>Third Year President</i> . . . . .	H. G. Thompson
<i>Second Year President</i> . . . . .	A. A. Bell
<i>First Year President</i> . . . . .	W. A. Osbourne
<i>Civil Club Representative</i> . . . . .	P. J. Culliton
<i>Mining Club Representative</i> . . . . .	A. E. O'Brien
<i>Electrical Club Representative</i> . . . . .	M. C. Stafford
<i>Chemical Club Representative</i> . . . . .	A. D. R. Fraser
<i>Architectural Club Representative</i> . . . . .	T. J. Young

The Society meets every second Wednesday during the academic year (except April), beginning with the third Wednesday in October. Papers are read, and discussions are held on engineering subjects. The Society publishes a journal monthly during the year, containing the best papers read at the meetings. A supply department is conducted by the Society, on a co-operative plan, through which instruments, drafting supplies, stationery, etc., may be purchased at a low cost. The Society is divided into five clubs for the purpose of affording a medium of study of matters relating in particular to the different departments of engineering.

**THE INDUSTRIAL CHEMICAL CLUB.****Officers for 1920-1921.**

<i>Hon. President</i> .....	. Prof. J. W. Bain
<i>Hon. Vice-President</i> .....	. Prof. E. G. R. Ardagh
<i>Chairman</i> .....	. A. D. R. Fraser
<i>Vice-Chairman</i> .....	. C. J. W. McKeown
<i>Fourth Year Representative</i> .....	. C. P. Lailey
<i>Third Year Representative</i> .....	. H. B. Meyer
<i>Second Year Representative</i> .....	. E. M. Begg
<i>First Year Representative</i> .....	. R. H. Gordon
<i>Secretary-Treasurer</i> .....	. H. Kestivan-Balshaw
<i>Curator</i> .....	. H. N. Baker

The object of the Chemical Club is to promote the study of industrial chemistry and chemical engineering. Illustrated lectures, preceded by an informal dinner and a short musical programme, are held fortnightly, and on the following day an excursion is made to industrial chemical concerns located in the city or vicinity.

**MECHANICAL AND ELECTRICAL ENGINEERING CLUB.****1920-1921.**

<i>Honorary Chairman</i> .....	. Prof. R. W. Angus
<i>Hon. Vice-Chairman</i> .....	. Prof. H. W. Price
<i>Chairman</i> .....	. M. C. Stafford
<i>Vice-Chairman and Fourth Year Representative</i> .....	. G. A. Brace
<i>Secretary and Third Year Representative</i> .....	. B. H. Johnston
<i>Treasurer and Second Year Representative</i> .....	. A. W. F. MacQueen
<i>Curator and First Year Representative</i> .....	. G. W. Smart

The Club meets every Thursday during the academic year for the discussion of papers relating to mechanical and electrical engineering problems.

**CIVIL ENGINEERING CLUB, 1920-1921.**

<i>Hon. Chairman</i> .....	. Prof. C. R. Young
<i>Chairman</i> .....	. P. J. Cullitan
<i>Vice-Chairman</i> .....	. E. W. Cockerline
<i>Secretary-Treasurer</i> .....	. C. D. MacQueen
<i>Fourth Year Representative</i> .....	. H. J. Elliott
<i>Third Year Representative</i> .....	. W. J. Foley
<i>Second Year Representative</i> .....	. M. C. Kelly
<i>First Year Representative</i> .....	. T. R. Emerson

The Club is addressed during the academic year by practising engineers on modern methods and problems in civil engineering.

**MINING AND METALLURGICAL CLUB.****1920-1921.**

<i>Hon. Chairman</i> .....	Prof. S. A. Guess
<i>Chairman</i> .....	A. E. O'Brien
<i>Vice-Chairman</i> .....	C. M. Beck
<i>Secretary-Treasurer</i> .....	R. J. Henry
<i>Second Year Representative</i> .....	V. B. Lyle
<i>First Year Representative</i> .....	J. Beattie
<i>Chairman Entertainment Committee</i> .....	W. P. Mackle

The Club is the official organization representing the undergraduates of Departments 2 and 8 of the Faculty of Applied Science.

The objects of the Club are to promote the spirit of good fellowship and mutual assistance amongst its members, both graduate and undergraduate, to provide a means of meeting together, and for the discussion of pertinent topics.

**STRUCTURAL CLUB.****1920-1921.**

<i>Honorary President</i> .....	Prof. C. R. Young
<i>President</i> .....	G. Dean Maxwell
<i>Vice-President</i> .....	C. B. Ferris
<i>Secretary-Treasurer</i> .....	G. L. McGee

The membership of the Structural Club comprises the Fourth Year Civil Engineering students taking the Structural Engineering option. Meetings are held from time to time at which addresses on structural subjects are given by prominent engineers, followed by a general discussion. The Club also undertakes to organize trips of inspection for its members to works of special interest to structural engineers.

**ARCHITECTURAL CLUB.****1920-1921.**

<i>Honorary Chairman</i> .....	H. E. Moore
<i>Chairman</i> .....	T. J. Young
<i>Vice-Chairman</i> .....	C. N. Haldenby
<i>Secretary</i> .....	A. S. Crawford
<i>Treasurer</i> .....	M. A. Norcross
<i>Third Year Representative</i> .....	J. B. Helme
<i>Second Year Representative</i> .....	J. G. Magee
<i>First Year Representative</i> .....	A. R. Smyth

**SKETCH CLUB.****1920-1921.**

<i>Honorary President</i> .....	C. W. Jefferys
<i>President</i> .....	G. R. Gouinlock
<i>Vice-President</i> .....	T. J. Young
<i>Secretary</i> .....	J. B. Heline
<i>Treasurer</i> .....	J. L. Van Camp

**DEBATING CLUB.****1920-1921.**

<i>Chairman</i> .....	G. A. Brace
<i>Secretary</i> .....	D. W. Rosebrugh,
<i>Fourth Year Representative</i> .....	J. D. Relyea
<i>Third Year Representative</i> .....	A. L. S. Nash
<i>Second Year Representative</i> .....	F. A. Murphy
<i>First Year Representative</i> .....	G. P. Sabiston
<i>Engineering Society Representative</i> .....	W. E. Bennett

**UNIVERSITY OF TORONTO ATHLETIC ASSOCIATION  
DIRECTORATE, 1920-1921.**

<i>Honorary President</i> .....	Sir Robert Falconer, K.C.M.G., LL.D., D.Litt.
<i>President</i> .....	M. A. McKenzie, M.A.
<i>Vice-President</i> .....	W. E. Blatz, M.A. •
<i>Secretary-Treasurer</i> .....	T. A. Reed
<i>Physical Director</i> .....	Dr. J. W. Barton

The Athletic Association has full control over all athletic clubs using the name of the Faculty of Applied Science. The Executive Committee has power to suspend any one from the privileges of membership in the Association for any breach of its regulations, and controls the finances of all athletic clubs in the aforesaid Faculty. The annual membership fee of this Association is fifty cents.

No other moneys are collected for the support of athletics in the Faculty of Applied Science without the sanction of the Executive Committee.

**ATHLETIC ASSOCIATION.****1920-1921.**

<i>President</i> .....	F. R. McDonald
<i>Vice-President</i> .....	G. W. Duncan
<i>Fourth Year Representative</i> .....	W. J. Parker
<i>Third Year Representative</i> .....	J. C. Perry
<i>Second Year Representative</i> .....	J. G. Johnston
<i>First Year Representative</i> .....	E. Littlejohn

**RUGBY FOOTBALL CLUB OF THE UNIVERSITY OF TORONTO.****Officers for 1920-1921.**

<i>Honorary President</i> .....	W. C. Foulds, B.A.Sc.
<i>Honorary Vice-President</i> .....	L. R. Shoebottom, B.A.Sc.
<i>President</i> .....	P. A. C. Ketchum
<i>Vice-President</i> .....	K. A. Hamilton
<i>Secretary-Treasurer</i> .....	A. S. Malcolmson
<i>Asst. Secretary-Treasurer</i> .....	L. E. Blackwell
<i>Manager senior team</i> .....	W. E. Blatz, M.A.
<i>Captain senior team</i> .....	J. M. Breen
<i>Honorary Coach</i> .....	Hamilton Cassels, Jr.

The Mulock Cup, which was presented by Sir Wm. Mulock, M.A., LL.D. to the University of Toronto Rugby Football Club for inter-college competition, brings out each year a large number of contestants from the University and affiliated colleges.

**ASSOCIATION FOOTBALL CLUB OF THE UNIVERSITY OF TORONTO.****Officers for 1920-1921.**

<i>Honorary President</i> .....	Prof. F. C. A. Jeanneret
<i>President</i> .....	S. H. Archibald
<i>Secretary-Treasurer</i> .....	H. F. Swan
<i>Manager</i> .....	B. I. Johnston

In order to encourage Association Football on the College campus, the Faculty of the University of Toronto presented a cup, known as the Faculty Cup, to the Inter-College Association Football Club for annual competition among University and affiliated colleges.

**HOCKEY CLUB OF THE UNIVERSITY OF TORONTO.****Officers for 1920-1921.**

<i>President</i> .....	P. F. McIntyre
<i>Captain</i> .....	W. B. Ramsay
<i>Honorary Coach</i> .....	W. A. Dafoe

The trophy which is competed for annually among the Colleges in hockey is known as the Jennings Cup, and is the gift of the late W. T. Jennings, Mem. Inst. C.E.

**TRACK CLUB.****Officers for 1920-1921.**

<i>Honorary President</i> .....	Dr. W. E. Hooper
<i>President</i> .....	Frank Halbus
<i>Secretary-Treasurer</i> .....	J. E. Buchan
<i>Manager</i> .....	K. L. Carruthers

**BOXING AND WRESTLING.**

<i>Honorary President</i> .....	Prof. T. R. Loudon
<i>President</i> .....	A. H. Livingstone
<i>Secretary-Treasurer</i> .....	G. Hewitt

**FENCING.**

<i>Honorary President</i> .....	Prof. Kittridge
<i>President</i> .....	H. D. Gallagher
<i>Secretary</i> .....	G. Hewitt

**GYMNASIUM CLUB.**

<i>Honorary President</i> .....	R. D. Huestis
<i>President</i> .....	P. J. Robinson
<i>Vice-President</i> .....	J. H. F. Adams
<i>Secretary and Manager</i> .....	M. H. Wolsey

**TENNIS.**

<i>Honorary President</i> .....	H. S. Spencer
<i>Secretary</i> .....	T. Sheard
<i>Asst. Secretary</i> .....	C. Thornton

**SWIMMING.**

<i>Honorary President</i> .....	Prof. F. C. A. Jeanneret
<i>President</i> .....	G. Lindsay
<i>Secretary-Treasurer</i> .....	J. B. Tudhope

**HARRIER.**

<i>Honorary President</i> .....	Rev. P. J. Dykes
<i>President</i> .....	Dr. E. H. Campbell
<i>Secretary</i> .....	R. H. V. Cook

**BASKETBALL CLUB.**

<i>President</i> .....	D. G. Gill
<i>Vice-President</i> .....	R. G. Stewart
<i>Secretary-Treasurer</i> .....	J. D. Graham

**FACULTY OF APPLIED SCIENCE.**  
**YOUNG MEN'S CHRISTIAN ASSOCIATION.**

The Y.M.C.A. of the Faculty of Applied Science was organized January 27th, 1905, and forms an integral part of the University of Toronto Y.M.C.A., which is a Federation of the Associations of the various Colleges and Faculties of the University. The object of the Association is to develop a true Christian manhood and to help the students in whatever way possible.

**FACULTY OF APPLIED SCIENCE.**  
**VARSITY REPRESENTATIVES.**

<i>Senior</i> .....	J. W. Gardner
<i>Junior</i> .....	F. W. Dunton

**UNIVERSITY OF TORONTO STUDENTS' ADMINISTRATIVE  
COUNCIL, 1920-1921.**

**Representatives from Engineering Society.**

<i>President Engineering Society</i> .....	R. W. Downie
<i>Fourth Year Representative</i> .....	J. R. McLean
<i>Third Year Representative</i> .....	H. G. Thompson
<i>Second Year Representative</i> .....	A. A. Bell
<i>First Year Representative</i> .....	W. A. Osbourne

### LODGING AND BOARD.

Accommodation is readily obtainable in numerous private boarding-houses within convenient distance of the University, at a cost of from twelve dollars a week upwards for comfortable lodging with board; or rooms may be rented at a cost from six dollars a week upwards, and board obtained separately at about seven dollars per week. A list of accredited boarding-houses is kept by the Secretary of the Students' Christian Association, and students are recommended to consult him with reference to the selection of suitable accommodation.

### UNIVERSITY RESIDENCES.

By the generosity of Mr. and Mrs. E. C. Witney and other friends, the University can now offer to some hundred and fifty men the peculiar advantages of residential life and excellent accommodation within its own grounds. The Residence, opened in November, 1908, consists of three Houses situated on the north side of Hoskin Avenue, opening upon a quadrangle, the fourth side of which is formed by Devonshire Place. They stand about two hundred yards to the north of University College and close to Hart House to which is attached the University Dining Hall. The buildings are known as the South, East and North Houses.

Each House contains twenty-four single rooms, one single suite, one double room and eleven suites, a suite comprising a study and two bedrooms. A large room in each building, with an open hearth and a library has been set aside as a common room. A lavatory with hot and cold shower baths is provided for every eight men. The buildings are heated by steam and lighted by electricity.

The University supplies the table, chairs, book-case, chiffonier, bed, mattress, pillows, linen and window shades for each room; it is prepared to furnish a drop-light for a nominal rental.

Each occupant is charged \$4.00 room-rent per week, payable to the Bursar four weeks in advance. The charge for each single suite is \$5.00 per week. These charges cover heat, light, house-service, house-laundry, and the use of the telephone. There is no separate dining hall connected with the Residence, but board may be obtained at the adjacent University Dining Hall.

Applications for rooms must be made in writing to the Secretary of the Residence Committee (address the Registrar's Office) and must be accompanied by a deposit of \$5.00. This deposit will be returned if the application be not granted, and will be forfeited if a room is assigned to the applicant and not taken by him, unless notice of his refusal of the room

be received by the Secretary in writing before September 22nd. It will be returned in full at the end of the College year if the room key be given back and the room and furniture left in a satisfactory condition. The following principles govern the allotment of rooms: (i) No student who, as a result of the annual Spring examinations, is not assured of being able to proceed to a subsequent year, will be admitted into the Residence. Exception to this rule will be made in the case of a student in the Faculty of Medicine who has obtained standing at the May examination, but is debarred by the rules of that Faculty from proceeding to the subsequent year until he has passed his Supplemental examinations. Such a student will be assigned a room provisionally, but cannot occupy it unless he passes his Supplemental examinations in September. (ii) The rooms in each House will be distributed between the various Faculties and Years. (iii) A limited number of rooms will be reserved for members of the incoming First Year until September 12th. (iv) Applications will be considered in order of priority.

The University lays down three general rules, designed to prevent hazing, the use of intoxicants and gambling. The students in each House shall elect a House Committee, which is entrusted by the University with the making and enforcing of any other needed rules and with the maintenance of order. A member of the Faculty resides in each House to act as friend and adviser to the men in residence.

#### **ROLL OF SERVICE.**

The final edition of the Roll of Service is now being published. In it the records of all the members of the University who were on active service in the War are given in an abbreviated form similar to that used in the previous editions, but with more details in so far as the facts have been ascertained in each case. The records of those who died on active service will be given more fully.



**FACULTY OF APPLIED SCIENCE.**  
**REGISTER OF STUDENTS, 1920-1921.**

First Year.

1	Adams, H. C.	Lindsay	7	DeCou, D. D.	Strathroy
2	Adamson, J. C.	Lambton Mills	3	Dill, R. H.	Nelson, B.C.
6	Agnew, E. A.	Toronto	1	Dillane, C. W.	Kemptville
7	Almond, J. R.	Toronto	6	Dow, J. A.	Toronto
7	Archibald, T. A.	Woodstock	1	Drummond, C. H. P.	Toronto
6	Armstrong, G. C.	Warkworth	3	Drummond, J. M. E.	Toronto
6	Baker, H. N.	Toronto	3	Dymond, J. M.	Toronto
6	Barbour, A. D.	Toronto	3	Elder, J. G.	Toronto
7	Barley, E. B.	Toronto	7	Elliott, W. K.	St. Thomas
6	Barrett, H. A.	Collingwood	1	Emerson, T. R.	Toronto
7	Baxter, L. H.	Drumbo	8	Enushevsky, M. I.	Toronto
7	Baxter, W. J. F.	Niagara Falls	7	Findlater, J. R.	Ayr
7	Beaman, A. E.	North Gower	4	Finlay, W. E.	Norwood
2	Beattie, J.	Galt	7	Firth, H. E.	Orangeville
7	Becker, W. A.	St. Thomas	6	Forward, F. A.	Ottawa
3	Bell, J. W.	Corunna	3	Gannon, L. J.	Ottawa
3	Bell, W. T. A.	Thornbury	6	Gilmore, L. E.	Toronto
3	Boake, W. R.	Toronto	3	Goldstein, A.	Toronto
1	Boswell, F. B.	Toronto	7	Good, E. F.	Blair
3	Boyes, J. W.	Hamilton	6	Gordon, R. A.	Wallaceburg
3	Brittain, C. L.	Toronto	2	Grabill, D. L.	Toronto
2	Browne, L. M.	Toronto	3	Graham, T. C. G.	Inglewood
6	Buck, L. G.	Brantford	7	Greenwood, A. H.	Palmerston
7	Burbank, J. D.	Toronto	7	Grenzebach, S. L.	Woodstock
6	Buschlen, H. C.	Port Elgin	2	Griffin, K.	Toronto
7	Cameron, G. D. W.	Peterboro	4	Haggans, H. H.	Toronto
7	Campbell, L. De V.	King	3	Hamilton, F. W.	Hamilton
7	Capel, A. J.	Collingwood	6	Hammond, H. J.	Toronto
4	Carswell, W. E.	Toronto	1	Hardcastle, S.	Toronto
3	Catto, C. E.	York Mills	1	Harman, W. J.	Zephyr
1	Chadwick, A. R.	Toronto	7	Hawkins, R. M.	Exeter
1	Chaffe, R. S. S.	Waterdown	1	Hazell, H. F.	Hamilton
1	Chambers, H. J. A.	Toronto	7	Hendershot, R. W.	Kingsville
2	Chowen, W. R.	Clinton	1	Henderson, G. G.	Toronto
6	Christman, C. W.	Windsor	7	Heyland, K. V.	Toronto
6	Chute, G. M.	Toronto	1	Hill, A. J.	Toronto
7	Clark, H. S.	Toronto	1	Ings, J. H.	Toronto
7	Clark, W. H. D.	Toronto	6	Jackson, L. C.	Brussels
4	Coleman, E. M.	North Bay	7	Jackson, T. W.	Toronto
1	Collison, L. S.	Leamington	4	Johnson, J. A.	Toronto
2	Colman, A. R.	Toronto	3	Keefer, R. H.	Toronto
6	Connors, W. M.	Smiths Falls	3	Kellough, J. Y.	Almonte
1	Connolly, H. J.	Toronto	6	Kerr, R. S.	Toronto
2	Cooper, W. C.	Clinton	3	Kerr, R. B.	Brantford
3	Cowan, W. R.	Toronto	6	Kilmer, G. E.	Southampton
1	Crane, A.	Aylmer	1	Kingston, T. M. S.	Toronto
3	Crossgrove, G. M.	Copper Cliff	1	Laine, D.	Toronto
6	Davidson, P. C.	Toronto	2	Lang, H. O.	Toronto
3	Davis, C. R.	Welland	6	Langton, J. M.	Toronto
7	Davis, F. Valleyfield, B.B., Nfld.		7	Laurie, R. M.	Hamilton
4	Deacon, P. A.	Toronto	3	Lavender, F. J.	Dundas
7	Dean, G. F.	Toronto	4	Lawson, A. W. P.	Leaside

6	Lindsay, T.	Weston	6	Rowland, S. A.	Mount Albert
7	Little, E. M.	Iroquois Falls	3	Rugg, H.	Toronto
6	Littlejohn, E.	Toronto	7	Rumble, G.	Hillside
7	Lowry, C. A.	Bridgeburg	6	Russell, N. E.	Toronto
6	Lowry, E. F.	Listowel	1	Sabiston, G. P.	Owen Sound
3	MacEwen, B. P.	Craik, Sask.	7	Samuel, N. M.	Toronto
3	MacKendrick, D. E.	Toronto	8	Saunders, T. D.	Toronto
3	MacLeod, M. P.	Toronto	1	Sharpe, C. T.	Toronto
1	MacQuarrie, E. M.	Sault Ste. Marie	3	Shibley, L. K.	Haileybury
1	MacQuarrie, J. D.	Merlin	7	Shields, S.	Ft. William
3	Mason, H. R.	Toronto	7	Simpson, W. C.	Elmvale
1	Matson, B. C.	Toronto	7	Sirrs, R. R.	Toronto
3	Maus, J. H.	Paris	7	Smart, G. W.	Toronto
3	McAndless, F. W.	Ilderton	7	Smith, J. D.	Pt. Hope
7	McDowell, W. O.	Toronto	7	Smith, V. G.	Toronto
3	McIntosh, H. A.	Port Arthur	4	Smyth, A. R.	Toronto
7	McKenzie, B. J.	Wawanese	3	Sneyd, C. S.	Preston
2	McKenzie, J.	Toronto	7	Sorby, W. O.	Guelph
7	McKillip, V. A.	West Lorne	1	Story, C. A.	Morrisburg
2	McLean, D. J.	London	3	Strickland, V. D.	Hamilton
6	McVicker, P.	Toronto	4	Sullivan, F. G.	Toronto
7	Millikin, G. I.	Midland	7	Switzer, R. H.	Toronto
7	Mitchell, J. H.	Toronto	3	Take, P. H.	Orangeville
7	Moffatt, B. F.	Weston	3	Taniyama, S., Hososhenia, Japan	
7	Moon, A. M.	Wiarton	7	Taylor, J. C.	Toronto
1	Mueller, E. K.	Hamilton	7	Tomlinson, G. K.	Simcoe
7	Muirhaed, S. R.	Regina Sask.	7	Tomsinsky, W.	Toronto
3	Noonan, W. H.	Toronto	7	Turner, H. E.	Brantford
7	Norman, R. M.	Galt	7	Vanderburgh, W. A.	
3	Osbourne, W. A.	Ramelton, Co. Donegal, Ireland			Richmond Hill
4	Palmer, G. V.	Toronto	7	Voaden, G. H.	St. Thomas
7	Patience, A. M.	Toronto	3	Wagner, J. F.	Kitchener
7	Pedder, J. F.	Trout Creek	7	Waite, G. G.	Colborne
6	Petry, H. H.	Port Hope	3	Wales, C. C.	Toronto
1	Pickford, G. S.	Toronto	6	Walton, W. W.	Toronto
7	Pike, J. G.	Todmorden	7	Wanless, G. A.	Windsor
8	Piper, R. L.	Calgary, Alta.	6	Watson, W. W.	Pt. Hope
3	Pugsley, H. J.	Kitchener	2	Wheatley, W. P.	Toronto
7	Ratcliffe, L. C.	Oshawa	3	Wilford, J. R.	Lindsay
3	Rattle, C. H.	Milliken	6	Willard, M. V.	Toronto
7	Reid, W. J. H.	Cardale, Man.	2	Williams, C. S.	Toronto
3	Robertson, G. D.	Petrolea	3	Williams, J. A.	Toronto
7	Robinson, F. H.	Toronto	1	Wilson, F. E.	Toronto
3	Rowat, G. H.	Toronto	6	Woodburn, C.	Toronto
			6	Yeats, F. B.	Stirling
			6	Young, C. M.	Toronto

**Second Year.**

1	Abernethy, W. W.	Beeton	1	Ball, F. C.	London
3	Acres, W. P.	Toronto	7	Barbour, Miss J. E.	Meadford
3	Albertson, R. G.	Niagara Falls	7	Bateman, J. W.	Tweed
3	Anderson, E. B.	Lindsay	7	Beckett, R. W.	Hamilton
2	Anderson, W. St. C.	Oil Springs	3	Bedford, H. F.	Toronto
1	Baird, E. L.	Toronto	3	Bedford, P. S.	Toronto
1	Baird, E. M.	Scarboro Jct.	1	Beecroft, G. W.	Toronto
7	Baird, H. P.	Toronto	7	Beger, A. R.	New Hamburg

6	Begg, E. M.	Toronto
6	Bell, A. A.	Toronto
7	Bell, H. B.	Georgetown
1	Bennett, W. E.	Ottawa
6	Berner, G. T.	Toronto
3	Blackburn, R. G.	Regina, Sask.
3	Boake, V. E.	Toronto
6	Bonham, L. J.	Dutton
3	Booz, F. B.	Toronto
2	Bowyer, C. M.	Simcoe
2	Boyd, O. H.	Toronto
3	Boyle, G. E.	Pt. Colborne
7	Bruels, C. P.	Belhaven
4	Brown, F. B.	Toronto
7	Brown, R. J.	Acton
7	Browne, J. H.	Haileybury
6	Bruce, V. N.	Toronto
6	Buchan, J. E.	Sarnia
2	Bull, W. J.	Weston
7	Bunting, W. R.	St. Catharines
7	Burke, J. P.	Ottawa
3	Butler, F.	Toronto
7	Butter, R.	Ancaster
3	Button, E. W.	Galt
1	Byram, A. T.	Toronto
7	Cain, L. A.	Toronto
6	Campbell, L. S.	Toronto
7	Campbell, T. L.	Elmvale
3	Carew, A. W.	Lindsay
3	Carley, F. C.	Consecon
6	Carnahan, E. H.	Campbellford
1	Carp, M.	Toronto
7	Carr, W. H.	Barrie
1	Carruthers, V. H. H.	Foremost, Alta.
6	Carson, C. T.	Oakville
7	Carson, R. W.	Toronto
4	Catto, D. E.	Toronto
7	Chadwick, N. B.	Toronto
8	Chambers, A. J.	Toronto
3	Chambers, F. W.	Hamiota, Man.
1	Church, J. A.	Smiths Falls
7	Churchill, T.-C. D.	Toronto
1	Clappison, H. G.	Hamilton
2	Cockshutt, C. F.	Brantford
8	Cohoe, J. E.	Welland
7	Colter, J. L.	Petrolea
6	Conklin, A. N.	Toronto
6	Coulter, H. J.	Windsor
3	Cowan, E.	Pt. Arthur
4	Crawford, A. S.	Hamilton
3	Crowe, G. F.	Truro, N.S.
7	Doherty, A. H.	Meaford
6	Duffill, W. H.	Toronto
8	Drummond, P. R.	Toronto
2	Dumbrille, J. C.	Kemptville
2	Dunbar, W. R.	Ethel
2	Duncan, G. G.	Toronto
1	Dunlop, C.	Saskatoon, Sask.
2	Dunlop, P. J.	Pembroke
3	Dyer, J. W.	Goderich
1	Earle, M. D.	Toronto
6	Edwards, P. S.	Buffalo, N.Y.
7	Elliott, F. W.	Toronto
7	Ellis, F. A.	Toronto
1	Erwin, R. B.	Watford
7	Evans, M. G.	Toronto
6	Ewing, C. W.	Toronto
3	Fairbairn, R. A.	Toronto
7	Fardoe, H. R.	Brandon, Man.
7	Faris, E. M.	Aurora
3	Farley, J.	Toronto
2	Farncomb, H. L.	Trenton
7	Fawcett, W. W.	Hamills Pt.
7	Ferrier, W. G.	Markham
7	Fiddes, G. H.	Elmwood
7	Finley, R. A.	Meaford
6	Fitzgerald, A. D.	Lakefield
3	Forster, I. H.	Toronto
7	Franks, S. T.	Regina, Sask.
3	Fraser, J. M.	Aurora
2	French, H. E.	Midland
7	Galbraith, R. A. H.	Toronto
7	Gardner, L. S.	Windsor
7	Garrow, K. A. C.	Chesterville
7	Gillmor, J.	North Bay
7	Gillmor, T.	North Bay
4	Givens, H. F.	Beaverton
3	Goldie, J. E.	North Vancouver, B.C.
6	Graham, H. F.	Owen Sound
1	Graham, H. J.	Brampton
6	Grant, N. S.	Stratford
7	Gray, A. S.	Toronto
2	Gray, K. C.	Coldwater
6	Greey, S. M.	Toronto
1	Griesbach, R. J.	Collingwood
7	Guenther, W. F.	Brantford
6	Hamilton, K. C.	Galt
3	Hanning, J. R.	Preston
6	Harston, J. C.	Toronto
1	Hawkins, W. J. H.	Islington
1	Hayman, H. L.	London
7	Hayward, A. E.	Toronto
7	Hepburn, D.	Milton West
6	Hewgill, R.	Toronto
1	Higbee, J. C.	Toronto
1	Hitchon, L. E.	Brantford
7	Howell, D. R.	Toronto
3	Hueston, R. M.	Ingersoll
8	Huggins, F. W.	Toronto
7	Ickler, C. H.	Chesley
7	Inglis, J. G.	Atwood
8	Ironside, J. G.	Simcoe

1	Irwin, K. W.	Oshawa	6	McBride, E. W.	Toronto
3	Ives, V. E.	Colborne	7	McBroom, H. E.	Toronto
1	Jackson, C. H.	Toronto	6	McBurney, W. G.	Niagara Falls
6	Jackson, H. A.	Ilderton	7	McCabe, R. H.	Tottenham
7	Jackson, W. C.	Port Perry	6	McClellan, G. E.	Vancouver B.C.
7	Jaques, C. A.	Woodstock	3	McCrae, G. W.	Lindsay
3	Jennings, W. B.	Sarnia	3	McCulloch, H. L.	Galt
3	Jewett, W. D.	Toronto	1	McIntosh, D. N.	Simcoe
1	Johnson, J. L.	Arthur	6	McIntosh, J. H.	Victoria B.C.
7	Johnson, N. F.	King	4	McIntyre, H. A.	Toronto
7	Johnston, A. M.	St. Catharines	1	McIntyre, V. H.	Toronto
7	Johnston, D.	Guelph	1	McKay, H. A.	Seaforth
3	Johnston, J. G.	Toronto	7	McKenzie, H. B.	Toronto
6	Johnston, O. D.	Billings Bridge	1	McLlland, W. J.	Hamilton
1	Joy, C. B.	Toronto	3	McMahon, T. J.	Maitland
6	Kay, G. F.	Toronto	2	McMaster, J. A.	Toronto
3	Keenleyside, H. B.	London	6	McMillan, R. J.	Stratford
1	Keith, W. H.	Newmarket	3	McMullen, A. W.	Toronto
3	Kelly, F. R.	Lindsay	8	McMurrich, J. R.	Toronto
1	Kelly, M. C.	Hamilton	7	McQueen, A. W. F.	Nottawa
3	Kennedy, H. L.	Parkhill	6	McQueen, M. V.	Toronto
3	Kennedy, W. M.	Toronto	7	Meikle, M.	Midland
1	Kenney, W. E.	Pt. Maitland	3	Menendez, C. G.	Nassau, Bahamas
7	Kent, W. H.	Hamilton	6	Meredith, H. J.	Vancouver, B.C.
6	Kesteven-Balshaw, H.	Toronto	7	Miller, W. H.	Galt
6	Kinsman, D. A.	Toronto	7	Miller, W. L.	Lawrence Station
3	Kischel, G. H.	Toronto	7	Mills, C. A.	Orangeville
6	Kramer, H. O.	Humberstone	3	Monkman, F. C.	Brampton
7	Lappin, W. D.	Toronto	7	Moon, G. D.	Port Hope
1	Langlois, W. L.	Toronto	1	Morris, H. M.	Petrolea
7	Laurie, W. L.	Agincourt	8	Morris, R. V.	Toronto
7	Lawton, F. L.	Toronto	7	Morrish, J. S.	Highland Creek
1	Learoyd, E. S.	Scarboro	2	Morrison, R. G. K.	Edmonton, Alta.
6	Lebeau, A. M.	Calgary, Alta.	2	Morton, C. O.	Toronto
1	Leslie, R. C.	Swansea	7	Morwick, E. I.	Jerseyville
1	Lewis, C. E.	Toronto	1	Moss, F. W.	Toronto
3	Lindsay, G. E.	Toronto	7	Murphy, F. A.	Wardsville
2	Logan, H. J.	Dunnville	6	Murphy, G. H.	New York, N.Y.
3	Longworthy, W. O.	Regina, Sask.	6	Murray, C. A.	Costra Rica, Central America
6	Low, R. St. C.	Toronto	3	Murray, J. R.	Toronto
7	Lucas, C. H.	Toronto	1	Murtha, L. J.	Lindsay
2	Lyle, F. J.	Brantford	8	Mutch, G. C.	Toronto
2	Lyle, V. B.	Peterboro	7	Nablo, H. W.	Cayuga
1	Lyons, R. T.	Toronto	7	Nahrgang, A. R.	New Hamburg
6	MacBeth, D.	Toronto	7	Nattress, D. I.	Sault Ste. Marie
6	MacDougall, H. A.	Toronto	2	Nethercott, F. A.	Stratford
3	MacKendrick, J. N.	Galt	1	Nettleton, C. A.	Toronto
1	Mackenzie, W. J.	Port Robinson	6	Norman, R. E.	Toronto
7	Macklin, W. H.	Milliken	1	Norris, C. A.	Toronto
7	MacLellan, J.	Claremont	4	Oldford, R.	Musgravetown Nfld.
1	Macqueen, C. B.	Toronto	6	Oliver, C. W.	Belton
6	Maedel, H. C.	Norwich	8	O'Shaughnessy, T. J.	Cobalt
4	Magee, J. G.	London	7	Paget, J. A.	Huntsville
2	Maguire, W. S.	Toronto	6	Parrett, A. E. J.	Toronto
1	Martin, G. A.	Toronto			
7	Martyn, E. R.	Ripley			
1	McAllister, D. G.	Toronto			

6	Parrett, R. E.	Toronto
3	Plewes, R. V.	Sarnia
3	Potvin, L. J.	Ottawa
7	Porter, W. J.	Powassan
6	Price, L. M.	St. Thomas
6	Pritchard, H. S.	Toronto
3	Purvis, W. F.	Toronto
7	Ratz, H. W.	New Hamburg
1	Reid, A. M.	Toronto
6	Relyea, R. C.	Cornwall
6	Robertson, G. H.	Toronto
6	Robertson, H. F.	Brantford
2	Robson, W. T.	Toronto
7	Rogers, E. S.	Toronto
3	Rolph, E. G.	Toronto
7	Romm, N.	Toronto
1	Rose, A. A.	Ailsa Craig
1	Rose, H. G.	Ottawa
4	Ross, D. M. M.	Toronto
7	Rossiter, R. E.	Sault Ste. Marie
7	Ruby, E. A.	Kitchener
7	Rundle, W. L.	Dundalk
2	Russell, W. J.	Unionville
1	Sanders, F. W.	Stouffville
3	Schinbein, E. E.	Conestogo
1	Schultz, F. H.	Brantford
7	Scott, F. A.	Orangeville
7	Scott, G. D.	Claremont
6	Seaborne, F. S.	Toronto
4	Seeli, E. S. S.	Lucan
6	Shaffer, B.	Welland
7	Sharp, R. A.	Sudbury
1	Siddall, K. C.	Islington
3	Simson, F. T.	Toronto
1	Smith, G. W.	Weston
1	Smith, J. M.	Durham
6	Smye, G. R.	Galt
7	Snow, R. B. L.	Juddhaven
6	Snyder, A. L.	Toronto
4	Sproatt, C. B.	Toronto
7	Stevens, E. C.	Toronto
3	Stevenson, H. J.	Toronto
2	Stewart, H. E.	Montreal, Que.
7	Stewart, W. D.	Toronto
1	Stokes, L. F.	Sombra
7	Story, R. A.	Claremont
3	Stott, F. W.	St. Thomas
6	Stuart, A. F.	Ottawa
3	Strudley, D. B.	Stratford
8	Thomson, G. A.	Toronto
7	Thomson, G. A.	Agincourt
3	Timmins, W. W.	Toronto
6	Tofflemire, R. H.	Windsor
2	Tomlinson, F. C.	Langstaff
3	Tuckey, F. E.	Victoria, B.C.
6	Turner, J. W.	Craighurst
6	Upper, F. A.	Niagara Falls
6	Veals, R. C.	Toronto
7	Vernon, A.	Toronto
6	Wade, C. A. G.	Grimsby
7	Walker, S. W.	Streetsville
1	Walker, W. H.	Stratford
1	Walks, J. D.	Chesley
6	Ward, N. F.	Hamilton
6	Warren, A. R.	Hespeler
3	Wells, C. M.	Toronto
1	Welsh, D. T.	Hamilton
7	West, G. R.	Northwood
7	White, W. A.	Toronto
3	Whiteside, J. J.	Little Britain
7	Wilkinson, G. I.	Wallenstein
6	Williams, B. I.	London
2	Williams, W. F.	Markham
3	Wingfield, H. E.	Dunnville
7	Wolsey, M.	Toronto
7	Wright, W. E.	Cadogan, Alta.
6	Zadnoff, M.	Toronto

## Third Year.

3	Ahara, E. V.	Toronto
1	Anderson, A. M.	Toronto
1	Archibald, S. W.	Seaforth
3	Armstrong, E. F.	Iroquois
1	Ashcroft, C. C.	York Mills
1	Aykroyd, G. C.	Toronto
7	Benson, W. R.	Toronto
7	Bishop, W. V.	Kimberley
6	Bongard, G. R.	Toronto
6	Breithaupt, C. L.	Kitchener
6	Broughall, G. M.	Toronto
2	Brown, E. L.	Toronto
7	Bryant, G. F.	Midland
7	Burns, D.	Brantford
3	Bysshe, H. A.	Springfield, Vermont
6	Campbell, W. A.	Toronto
1	Carruthers, K. L.	Toronto
6	Carslake, C. H.	Toronto
6	Chantler, H. McD.	Mt. Dennis
1	Chater, W. N.	Toronto
1	Clairmont, W. L.	Gravenhurst
2	Clarke, A. R.	Toronto
1	Clarke, T.	Toronto
1	Cockerline, E. W.	Toronto
7	Coles, F. B.	Brantford
2	Coo, C. W.	Toronto
1	Cook, R. H. B.	Aurora

7	Coulter, S. L.	Windsor	6	Lindsay, A.	Dover Centre
6	Crawford, J. J.	Toronto	3	MacAllister, J. S. E.	Toronto
6	Day, G. A.	Guelph	2	Mackie, W. P.	Toronto
6	Dignam, H. M.	Toronto	8	Mallett, G. S.	Toronto
6	Dilworth, H. M.	Toronto	7	Mayberry, J. S.	Stratford
1	Dougall, C. H.	Hamilton	1	McClintock, G. A.	
7	Doran, J. Y.	Toronto			St. Andrews East, Quebec
2	Drybrough, J.	Sudbury	1	McGrath, R. J.	Toronto
3	Dunbar, P. G.	St. Thomas	7	McHaffie, R. P.	Nokomis, Sask.
7	Duncan, W. C. C.	Toronto	6	McKeown, C. J. W.	Mono Road
3	Dunn, E. A.	Chatham	6	McLaughlin, R. R.	Toronto
3	Elliott, W. B.	St. Catharines	7	McLean, G. E.	Thornbury
3	Evans, G. F.	Bradford	1	McMurtry, L. C.	London
3	Evans, M. M.	Bradford	2	McNiven, J. G.	Acton
6	Everest, T. E.	Toronto	8	Mellish, A. H.	Brantford
3	Everson, S. F.	Oshawa	6	Meyer, H. B.	Brantford
6	Fair, A. E. H.	Midland	7	Miller, B. H.	Stouffville
7	Fenwick, J. R.	Toronto	7	Milne, J. W.	Toronto
7	Fitzgerald, W. W.	Toronto	7	Montemurro, M. M.	North Bay
1	Foley, W.	Ottawa	6	Moor, H. H.	Toronto
6	Fotheringham, D. T.	Toronto	6	Mueller, H. H.	Toronto
1	Fry, C.	Chesley	3	Mummery, C. R.	Hamilton
7	Fuller, G. B.	Arkona	3	Murphy, A. R.	Wardsville
3	Gardner, J. W.	Hamilton	1	Nash, A. L. S.	Dunnville
1	Gibbs, J. W. S.	Kincardine	4	Norcross, M. A.	
1	Glover, T. S.	Hessle, England			Lennoxville, Que.
7	Goodwin, J. E.	Toronto	4	Noxon, K. F.	Toronto
6	Grant, W. J.	Toronto	2	Oaks, H. A.	Preston
6	Gray, F. M.	Toronto	3	Park, R.	Hamilton
3	Greig, A. K.	Toronto	6	Parker, R. E.	Tavistock
7	Graves, H. P.	London	6	Parker, R. R.	Stirling
1	Guscott, A. G.	Toronto	1	Paul, R. J.	Sunderland
6	Haldenby, C. N.	Toronto	3	Pearce, W. R.	Toronto
6	Hamilton, C.	Toronto	6	Pearen, C. B.	Toronto
3	Harlow, G. H.	Toronto	2	Perry, J. C.	Uxbridge
1	Hayman, H. G.	Toronto	7	Philip, E. B.	Islington
6	Heatley, A. H.	Brampton	3	Philp, H. J.	Nestleton
2	Heisey, K. B.	Markham	1	Pollock, F. J.	Almonte
3	Helliwell, A. L.	Toronto	1	Powell, H. R.	Grenfell, Sas.
4	Helme, J. B.	Smiths Falls	3	Powell, M. V.	Petreboro
2	Henry, R. J.	Grimsby	1	Pratt, D. L.	Midland
3	Henry, S. W.	Stratford	1	Ramsay, W. B.	Lumsden, Sask.
7	Houston, F. C. A.	Toronto	6	Reynolds, H.	Toronto
7	Howden, H. E.	Caledonia	6	Richardson, W. R.	Essex
3	Hume, A. G.	Toronto	7	Ridout, G. S.	Montreal, Que.
6	Johnson, A.	Orillia	8	Robertson, W. G.	Palmerston
7	Johnston, B. H.	Toronto	2	Robinson, L. J.	Toronto
7	Johnston, J. W.	Uxbridge	7	Rosebrugh, D. W.	Toronto
6	Kay, J. A. C.	Stratford	7	Ross, M. D.	Chatham
3	Kerr, H. H.	Seaforth	7	Ruddy, T. F.	Brantford
3	Kirkconnell, H. R.	Lindsay	3	Sanderson, A. C.	Toronto
3	Kirkconnell, J. R.	Lindsay	7	Scadding, S. C.	Humber Bay
2	Lawson, H. H.	Toronto	6	Schemnitcz, D. A.	Toronto
2	La Ronde, H. J.	Toronto	6	Sherk, W. S.	Sherkston
7	Langford, J. A.	Calgary, Alta.	7	Shockley, H. M.	
7	Lidkea, H. J.	North Bay			Prince Rupert, B.C.
1	Little, A. M.	Toronto	7	Smillie, S. S.	Toronto

6	Spence, F. S.	Toronto
7	Spotton, J. G.	Guelph
1	Stewart, M. D.	Toronto
3	Stewart, V.	Milestone, Sask.
2	Stratford, A. H.	Toronto
3	Stuart, G. L.	Toronto
7	Thomlinson, J. F.	Toronto
3	Thompson, H. G.	Belmont
7	Thompson, R. J.	Toronto
7	Trent, E. E.	Toronto
7	Weldon, H. S.	Oakwood
1	West, J. A.	Simcoe
6	Westren, J. H.	Toronto
7	White, R. E.	Ottawa
3	Wilford, H. J. D.	Lindsay
1	Williams, R. H.	Burlington
3	Williams, S.	Toronto
7	Williamson, R. J.	Toronto
6	Winter, L. A. G.	Toronto
3	Woelfle, E. J.	Chesley
6	Wass, F. L.	St. Marys
6	Wynne-Roberts, R. I.	Toronto
3	Yack, W. L.	Walkerton
1	Zealand, E. L.	Hamilton

**Fourth Year.**

6	Affleck, J. K.	Toronto
1	Angus, J. C.	Toronto
1	Augustine, W. P.	Port Colborne
1	Baker, G. H.	Toronto
6	Barry, T. M.	Hamilton
2	Beck, C. M.	Penetanguishene
5	Bell, J. C.	Toronto
3	Blue, A. C.	Wallacetown
3	Booth, G. E.	Toronto
1	Bowman, N.	Kitchener
7	Brace, G. A.	Toronto
1	Breen, J. M.	Long Branch
6	Brody, D.	Toronto
1	Burton, H. R.	Toronto
3	Chaikoff, S.	Toronto
5	Churchill, J. W.	Toronto
1	Coulter, W. D.	Port Robinson
2	Craigie, D. E.	Toronto
3	Crane, H. C.	Toronto
1	Culliton, P. J.	Stratford
3	Dickenson, M. E.	Hamilton
7	Doherty, W. A.	Toronto
2	Doner, G. B.	Stayner
5	Downey, F. P.	Toronto
1	Downie, R. W.	Toronto
3	Dunton, F. W.	Brampton
7	Durbrow, P. A.	Renfrew
3	Eckert, R.	London
7	Eley, F. C.	Toronto
5	Elliott, C. R.	Toronto
1	Elliott, H. J.	Toronto
6	Emory, V. H.	Toronto
5	Fair, H. A.	Toronto
5	Fasken, J. E.	Kippen
2	Fawcett, T. C.	Gravenhurst
1	Ferris, C. B.	Toronto
5	File, R. R.	Toronto
7	Flynn, J. P.	Merriton
5	Fraser, A. D. R.	Toronto
3	Galbraith, S. L.	Macleod, Alta.
4	Gallanough, R.	Toronto
1	Gillespie, J.	Seaforth
1	Gilley, J. R.	New Westminster, B.C.
5	Goldstick, D.	Toronto
4	Gouinlock, G. R.	Toronto
1	Graham, D. S.	Inglewood
7	Graham, H. C.	Elmvale
6	Gundy, J. V.	Windsor
5	Haberman, W. U.	Toronto
4	Haldenby, E. W.	Toronto
4	Hall, R. W.	Brampton
7	Hamilton, A. E.	Toronto
3	Hamilton, J. B.	Fort Qu Appelle, Sask.
2	Hannan, B. T.	Toronto
3	Henry, S. E.	Stratford
7	Hepburn, G.	Milton
3	Herold, W. H.	Shakespeare
3	Hulfish, B. W.	Toronto
8	Irwin, A. L.	Toronto
3	Keenleyside, R. D.	London
6	Knight, H. A.	Guelph
5	Lailey, C. P.	Toronto
3	Laird, C. H.	Hamilton
7	Landsberg, M. A.	Toronto
3	Lawrence, A. M.	Toronto
1	Legate, J. H.	Owen Sound
4	Livingston, A. H.	Brantford
5	Logan, I. M.	Niagara Falls
7	Lyon, G. M.	Toronto
3	Macdonald, D. M.	Edmonton, Alta.
2	MacKenzie, A. P.	Toronto
1	MacLean, C. H.	Toronto
7	MacLean, H. K.	Toronto
1	Marsh, E. J.	Grimsby
3	Maunder, W. F.	Toronto
1	Maxwell, G. D.	Toronto
7	McClelland, J. P.	Arthur
3	McDonald, F. R.	Toronto
1	McGee, G. L.	Toronto
8	McIntrye, P. F.	Perth
6	McLean, B. M.	London

1	McLean, J. R.	Toronto	3	Shortt, J. E. B.	Toronto
7	McLellan, J. D.	Toronto	3	Simmers, J. A.	Toronto
3	McNaughton, L. T.	London	2	Simpson, F. W.	Thornhill
1	Meader, J. C.	Toronto	1	Smith, C. T.	St. Thomas
1	Mitchell, J. C.	London	7	Smith, W. M.	Brantford
1	Monteith, J. C.	Stratford	3	Spencer, H. S.	Picton
4	Niece, H. P.	Preston	3	Stafford, M. C.	Toronto
1	Nixon, W. H.	Toronto	7	Stalker, W. D.	Simcoe
2	O'Brien, A. E.	Toronto	1	Steel, G. E.	Toronto
1	Parker, W. J.	Toronto	1	Taylor, F. H.	Toronto
1	Pepler, S. H.	Toronto	7	Tracey, G. F.	Toronto
6	Phillips, J. F.	Toronto	1	Vardon, L. M.	Toronto
1	Pinel, W. G.	Toronto	3	Voaden, V.	St. Thomas
7	Prendergast, R. M.	Toronto	1	Waddell, F. M.	Brantford
5	Presgrave, R.	Toronto	7	Wallace, J. S. M.	Galt
7	Preston, H. E.	Midland	7	Ward, J. W.	Simcoe
1	Proctor, W. D.	Satnia	1	Warwick, R. S.	Brussels
2	Purdy, H. E.	Port Perry	5	Weelands, J. E.	Toronto
7	Ratcliff, J. H.	Stouffville	3	West, T. M.	Toronto
1	Rayner, G. V.	Hamilton	7	Wilson, A. S.	Woodstock
3	Relyea, J. De W.	Prescott	4	Wilson, W. S.	Owen Sound
1	Richardson, F. C.	Montgomery, Wales	1	Wimperly, C. C.	Oakville
2	Roph, E. A.	Toronto	6	Wingfield, A. H.	Hamilton
5	Sale, C. P.	Ford	4	Wright, B. H.	Toronto
6	Schierholz, O. J.	Elmira	2	Wyllie, W. J.	Kamloops, B.C.
7	Shephard, G. R.	Toronto	2	Young, J. F.	Toronto
8	Shepard, H. M.	Hamilton	4	Toung, T. J.	Toronto

**Occasional.**

Wilson, A. E.	Toronto
---------------	---------

**Summary.**

First Year Students	192
Second Year Students	316
Third Year Students	162
Fourth Year Students	135
Occasional	1
 Total	 806

**Scholarship.**

Awarded by the Boiler Inspection and Insurance Co. of Canada for General Proficiency in the Third Year in Mechanical Engineering.

1912. A. S. Anderson	1917. W. D. Robertson
1913. E. D. W. Courtice	1918. T. W. Campbell
1914. C. G. Davey	1919. J. L. Chambers and
1915. L. L. Youell	M. L. Weir
1916. A. M. Snider	1920. H. C. Crane

**Degree of Master of Applied Science (M.A.Sc.).**

1915.	Avery, C. R.	1915.	Parkinson, N. F.
1916.	Dobson, W. P.	1915.	Robertson, C. S.
1914.	Murdie, W. C.	1915.	Rolfson, O.
1916.	Parker, G. C.	1915.	Treloar, G. E.

**PROFESSIONAL DEGREES****Degree of Civil Engineer (C.E.).**

1898.	Alison, T. H.	1895.	McAllister, J. E.
1889.	Ashbridge, W. T.	1901.	McDowall, R.
1915.	Bennett, G. A.	1898.	Mitchell, C. H.
1895.	Bowman, A. M.	1896.	Moore, J. E. A.
1893.	Bowman, F. M.	1885.	Morris, J. L.
1915.	Challies, J. B.	1909.	Oliver, E. W.
1892.	Chewett, H. J.	1919.	Parker, G. C.
1920.	Clark, G. T.	1919.	Robinson, L. H.
1900.	Connor, A. W.	1915.	Smith, A.
1913.	Dallyn, F. A.	1917.	Smith, W. C.
1915.	Davison, A. E.	1920.	Snaith, W.
1901.	Francis, W. J.	1915.	Stayner, D. S.
1920.	Gibson, J. M.	1918.	Sutherland, C. C.
1914.	Gillespie, P.	1911.	Swan, W. G.
1900.	Haultain, H. E. T.	1917.	Taylor, Thos.
1914.	Hill, S. N.	1892.	Thomson, T. K.
1914.	Hogg, T. H.	1917.	Townsend, C. J.
1893.	Innes, W. L.	1919.	Traill, J. J.
1913.	James, E. A.	1894.	Tyrrell, H. G.
1916.	Johnston, C.	1889.	Tyrrell, J. W.
1916.	Johnston, J. T.	1920.	Underwood, J. E.
1886.	Kennedy, J. H.	1920.	Walcott, W. D.
1908.	Maccallum, A. F.	1916.	Watson, M. B.
1913.	Marrs, C. H.	1914.	Young, C. R.
1920.	Marshall, J. A. P.	1919.	Young, R. B.

**Degree of Mining Engineer (M.E.).**

1897.	Bucke, M. A.	1900.	Laidlaw, J. T.
1912.	Burwash, L. T.	1910.	McMillan, J. G.
1915.	Campbell, A. D.	1915.	Neilly, B.
1913.	Forbes, D. L. H.	1909.	Thomson, R. W.
1920.	Hamilton, C. B.		

**Degree of Mechanical Engineer (M.E.).**

1916.	Acres, H. G.	1905.	Laschinger, E. J.
1915.	Campbell, A. M.	1913.	Manson, G. J.
1913.	Christie, A. G.	1919.	Parkin, J. H.
1913.	Darling, E. H.	1913.	Smart, R. S.
1908.	Fensom, C. J.	1918.	Watson, M. B.
1901.	Johnston, A. C.	1900.	White, A. V.

**Degree of Electrical Engineer (E.E.).**

1903.	Chubbuck, L. B.	1913.	Mitchell, P. H.
1902.	Elliott, H. P.	1915.	Palmer, C. E.
1905.	Hemphill, W.	1896.	Ross, R. A.
1920.	MacKenzie, A. M.	1914.	Sara, R. A.

### GRADUATES.

Graduates are requested to inform the Secretary of changes in their addresses.

Graduating departments are represented as follows:

1. Civil Engineering.
2. Mining.
3. Mechanical.
4. Architecture.
5. Analytical and Applied Chemistry.
6. Chemical Engineering.
7. Electrical.
8. Metallurgical.

Up to and including 1911, 3 represented the combined departments of Mechanical and Electrical Engineering.

#### 1881.

1. J. L. MORRIS, C.E., O.L.S.,  
*Private Practice as Civil Engineer.* Pembroke, Ont.

#### 1882.

1. D. JEFFREY,  
*Contractor.* Windsor, Missouri
1. J. H. KENNEDY, C.E., O.L.S., 1215 11th Ave., W., Vancouver, B.C.  
*Chief Engineer, Vancouver, Victoria and Eastern Ry.*
1. J. McAREE, B.A.Sc., D.T.S. (deceased).

#### 1883.

1. D. BURNS, O.L.S., A.M.E.I.C. (deceased).
1. G. H. DUGGAN, D.Sc., M.E.I.C.,  
*President and Chief Engineer, Dominion Bridge Co., Ltd.* Lachine, Que.
1. J. W. TYRRELL, C.E., D.L.S., O.L.S., M.E.I.C.,  
*J. W. Tyrrell & Co.* Hamilton, Ont.

#### 1884.

1. W. C. KIRKLAND (deceased).
1. J. McDougall, B.A. (deceased).
1. A. R. RAYMER,  
*Assistant Chief Engineer, P. & L. E. Ry.* Pittsburgh, Pa.
1. JAMES ROBERTSON, O.L.S., 531 Palmerston Ave., Toronto, Ont.  
*Commissioner, The Canada Co.*
1. E. W. STERN, M. Am. Soc. C.E., 56 West 45th St., New York, N.Y.  
*Consulting Engineer.*

#### 1885.

1. J. F. BLEAKLEY,  
*Civil Engineer.* Bowmanville, Ont.
1. H. J. BOWMAN, D. & O.L.S., M.E.I.C., (Deceased)
1. E. E. HENDERSON, O.L.S.,  
*Civil Engineer.* Henderson P.O., Me.
1. B. A. LUDGATE, O.L.S.,  
*Assistant Engineer, P. & L. E. Ry.* Pittsburgh, Pa.
1. O. MCKAY, O.L.S., (deceased).

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 111

1886.

1. A. M. BOWMAN, D.L.S., Pittsburgh, Pa.  
*Pennsylvania Contracting Co.*
1. E. B. HERMON, D. & O.L.S., 423 Hamilton St., Vancouver, B.C.  
*Assistant Engineer, Vancouver Power Co.*
1. ROBERT LAIRD, O.L.S. (deceased).
1. T. KENNARD THOMSON, D.Sc., C.E., M.E.I.C., M.Am.Soc. C.E., Hudson Terminal Building, New York, N.Y.  
*Consulting Engineer.*
1. H. G. TYRELL, C.E., A.M.E.I.C., New York  
*Consulting Engineer.*

1887.

1. J. C. BURNS (deceased).
1. A. E. LOTT, Los Angeles, Cal.  
*Consulting Railway Engineer.*
1. A. L. McCULLOUGH, O.L.S., B.C.L.S., A.M.E.I.C., Nelson, B.C.  
*Engineer and Surveyor.*
1. F. MARTIN, M.B., O.L.S., Dundalk, Ont.  
*Physician.*
1. C. H. PINHEY, D. & O.L.S., 110 Wellington St., Ottawa, Ont.
1. J. ROGERS, O.L.S., Mitchell, Ont.  
*Town Engineer.*

1888.

1. J. F. APSEY, O.L.S., 2118 St. Paul St., Baltimore, Md.  
*Assistant Division Engineer, Baltimore Sewerage Commission.*
1. W. T. ASHBRIDGE, C.E., Toronto, Ont.  
*Engineer and Surveyor.*
1. EDWARD F. BALL, A.M.E.I.C., 335 Madison Ave., New York, N.Y.  
*Chief Assistant Engineer of Resurveys, Land and Tax Department, N.Y. Central and Hudson River Railroad.*
1. D. B. BROWN, O.L.S., Quebec, P.Q.  
*Locating Engineer, Transcontinental Ry. (G.T.P.)*
1. C. M. CANNIFF, Toronto, Ont.  
*Department of Soldiers' Civil Re-establishment.*
1. H. J. CHEWETT, B.A.Sc., C.E., A.M.E.I.C. (deceased).
1. J. GIBBONS, D. & O.L.S., 1631 Collingwood St., Vancouver, B.C.
1. R. McDOWALL, O.L.S., C.E., A.M.E.I.C., Owen Sound, Ont.  
*Town Engineer.*
1. G. W. MCFARLEN, O.L.S., Toronto, Ont.  
*City Engineer's Staff.*
1. C. J. MARANI, Anacortes, Wash.  
*Designing and Consulting Structural Engineer for the Russia Cement Co.*
1. G. R. MICKLE, B. A., Toronto, Ont.  
*Mine Assessor, Province of Ontario.*
1. J. H. MOORE, O.L.S., Smith's Falls, Ont.  
*Private Practice.*
1. G. H. RICHARDSON, Port Alberni, B.C.  
*Esquimalt & Nanaimo Ry. Co.*
1. K. ROSE, Curry Bldg., Toronto, Ont.  
*Manager, Evans Rotary Engine Co. of Canada.*
1. J. E. ROSS, D. & O.L.S., Kamloops, B.C.  
*Surveying Staff, Department of Interior.*
1. C. H. C. WRIGHT, B.A.Sc., Toronto, Ont.  
*Professor of Architecture, University of Toronto.*

## 1889.

1. B. CAREY,  
1. W. J. CHALMERS,  
1. W. A. CLEMENT, M.E.I.C.,  
*Municipal Engineer.*  
1. G. F. HANNING,  
*Hydro Electric Power Commission.*  
1. H. E. T. HAULTAIN, C.E., Asso. Mem., I.C.E., M.I.M.M., M.E.I.C.,  
*Professor of Mining Engineering, University of Toronto.*  
1. J. IRVINE (deceased).  
1. D. D. JAMES, B.A., B.A.Sc.,  
*Surveyor.*  
1. F. X. MILL (deceased).  
1. H. K. MOBERLEY, D. & S.L.S.,  
*District Engineer and Surveyor.*  
1. T. R. ROSEBRUGH, M. A.,  
*Professor of Electrical Engineering, University of Toronto.*  
1. T. WICKETT, M.D.,  
*Physician.*

Toronto, Ont.  
Vanport, Beaver Co., Pa.  
Duncan, B.C.

Clarkson, Ont.

Toronto, Ont.

*Professor of Mining Engineering, University of Toronto.*

## 1890.

5. W. E. BOUSTEAD (deceased).  
1. F. M. BOWMAN, C.E., O.L.S.  
*Blaw Steel Const. Co.* 1234 N. Highland Ave., Pittsburgh, Pa.  
1. M. A. BUCKE, M.E. (deceased).  
1. G. D. CORRIGAN (deceased).  
1. J. A. DUFF, B.A. (deceased).  
1. A. B. ENGLISH (deceased).  
1. N. L. GARLAND, 76 Wellington St. W., Toronto, Ont.  
1. J. HUTCHEON, O.L.S., Parliament Bldgs., Toronto, Ont.  
*Dept. of Lands, Forests and Mines.*  
1. W. L. INNES, C.E., O.L.S., Simcoe, Ont.  
*Manager, Dominion Canners, Ltd.*  
1. E. B. MERRILL, B.A., B.A.Sc., M.E.I.C., M. Am. Inst. E.E.,  
*Engineer, Hydro Electric Power Commission.* Toronto  
1. J. R. PEDDER (deceased).  
3. R. A. ROSS, E.E., 2 Youville Square, Montreal, Que.  
*Member, Administrative Commission of City of Montreal.*  
1. T. H. WIGGINS, O.L.S., Saskatoon, Sask.  
*Civil Engineer and Dom. Land Surveyor.*  
1. W. J. WITHROW (died while on Active Service, 1917).

## 1891.

1. H. J. BEATTY, O.L.S., Beatty & Pierce Pembroke, Ont.  
*Engineer and Surveyor.*  
1. T. R. DEACON, O.L.S., M.E.I.C., Winnipeg, Man.  
*President and General Manager, Manitoba Bridge & Iron Works, Ltd.*  
1. C. W. DILL, M.E.I.C., Regina  
*Superintendent of Highways, Province of Manitoba.*  
5. O. S. JAMES, B.A.Sc., 6 Leuty Ave., Toronto, Ont.  
1. A. LANE (deceased).  
1. J. E. MCALLISTER, B.A.Sc., C.E., Hamilton, Ont.  
*Gen. Mgr. National Steel Car Co.*  
3. E. B. MERRILL, B.A., B.A.Sc., M.E.I.C., M. Am. Inst. E.E.,  
*Engineer, Hydro Electric Power Commission.* Toronto  
1. J. E. A. MOORE, C.E. 1900 Euclid Ave., Cleveland, O.  
*Marani & Moore, Civil and Mechanical Engineers.*

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 113

1891—Continued.

1. W. NEWMAN, O.L.S., A.M.E.I.C., Consulting Engineer and Contractor. Winnipeg, Man
1. J. K. ROBINSON (deceased).
1. W. B. RUSSEL, Civil Engineer and Contractor. Excelsior Life Bldg., Toronto, Ont.
1. G. E. SILVESTER, O.L.S., M. Am. Inst. M.E., International Nickel Co. of Canada, Ltd. Harbour Comm. Building, Toronto, Ont.
1. H. D. SYMMES (deceased).

1892.

1. J. R. ALLAN, O.L.S., Waseca, Sask.
1. T. H. ALISON, B.A.Sc., C.E., Bayonne, N.J.  
*Secretary and Chief Engineer, Bergen Point Iron Works.*
1. A. G. ANDERSON, Port Dover, Ont.  
*Hardware Merchant.*
1. C. C. FAIRCHILD, D. & O.L.S. 608 Tegler Blk., Edmonton, Alta.  
*Consulting Engineer and Surveyor.*
1. J. B. GOODWIN, B.A.Sc., M.E.I.C. Niagara Falls, Ont.  
*Works Engineer, H.E.P. Development.*
4. C. E. Langley, North America Life Bldg., Toronto, Ont.  
*Langley & Howland, Architects.*
1. A. T. LAING, B.A.Sc., Toronto, Ont.  
*Secretary and Assistant Professor, of Applied Mechanics, Faculty of Applied Science, University of Toronto.*
1. E. J. LASCHINGER, B.A.Sc., M.E., Johannesburg, Transvaal, S.A.  
*Hydraulic and Air Power Engineer, Central Mining and Investment Corporation.*
5. W. L. LAWSON, B.A.Sc., Billings, Mont.  
*Asst. Gen. Manager, Great Western Sugar Co.*
3. W. A. LEE, B.A.Sc. (deceased).
1. B. MCENTEE, B.A.Sc., 28 Queen St. E., Toronto, Ont.  
*Stationer.*
3. C. G. MILNE, B.A.Sc. (deceased),
1. C. H. MITCHELL, B.A.Sc., C.E., M.E.I.C., M. Am. Inst. Soc. C.E., Brigadier-General Consulting Engineer, Toronto, Ont.  
*Dean, Faculty of Applied Science and Engineering, University of Toronto.*
1. N. L. PLAYFAIR, Vancouver, B.C.
1. J. M. PRENTICE (deceased).
1. J. A. ROSS, Cleveland, Ohio  
*Designer L. S. & M. S. Railway, Engineering Office.*
1. ALBERT N. SMITH, Youngstown, Ohio  
*Engineer, Wm. B. Pollock Co.*
1. R. W. THOMSON, B.A.Sc., M.E., Kamloops, B.C.  
*Dist. Mining Engineer for B.C.*
3. A. V. WHITE, M.E., Toronto, Ont.  
*Engineer, Commission of Conservation.*

1893.

1. A. G. ARDAGH, Barrie, Ont.  
*Land Surveyor and Civil Engineer.*
- 4.\*H. F. BALLANTYNE, B.A.Sc., 120 Hawthorne Ave., Ottawa  
*Architect.*

1893. *Continued*

1. G. L. BROWN, O.L.S., A.M.E.I.C.,  
*Civil Engineer and Land Surveyor.* Morrisburg, Ont.
1. \*L. C. CHARLESWORTH, D.L.S., M.E.I.C.,  
*Deputy Minister of Public Works.* Edmonton, Alta.
1. T. H. DUNN, D. & O.L.S., M.E.I.C.,  
*Water Power Branch, Dept. of the Interior.* Ottawa, Ont.
1. J. M. R. FAIRBAIRN, P.L.S., M.E.I.C.,  
*Chief Engineer, C.P.R.* Montreal, Que.
- 4.\*W. FINGLAND,  
*Architect.* 313 Fort St., Winnipeg, Man.
1. C. FORRESTER,  
Toronto, Ont.
- 1.\*WALTER J. FRANCIS, C.E., M.E.I.C., M. Am. Soc. C.E.,  
260 St. James St., Montreal, Que.  
*Walter J. Francis & Co., Consulting Engineers.*
- 3.\*A. R. GOLDIE,  
*Manager, Goldie & McCulloch Co.* Galt, Ont.
3. S. C. HANLY,  
*Midland Iron Works Co.* Midland, Ont.
- 4.\*J. KEELE, A.M., B.A.Sc.,  
*Ceramic Engineer, Dept. of Mines.* Ottawa, Ont.
1. J. T. LAIDLAW, B.A.Sc., M.E.,  
*Consulting Mining Engineer.* Cranbrook, B.C.
3. F. L. LASH,  
*Manager, Electrical Supply Co., Board of Trade Building.* Bandoeng, Java
1. A. L. MCALISTER, B.A.Sc.,  
*Consulting Engineer.* c/o 14 Herkimer Apts., Herkimer St., Hamilton, Ont.
1. T. J. MCFARLEN,  
*Chemist, Antikokan Iron Co.* Port Arthur, Ont.
1. A. J. MCPHERSON, B.A.Sc., D.L.S.,  
*Consulting & Advising Eng.* 305 Sterling Trust Bldg., Regina, Sask.
1. A. F. MACALLUM, B.A.Sc., C.E.,  
*Commissioner of Works.* Ottawa, Ont.
1. W. T. MAIN,  
*Divisional Engineer, C. & N. N.W. Ry.* Silverton, Oregon
1. V. G. MARANI, C.E.,  
*Chief Engineer, Gypsum Industries Association.* Chicago, Ill.
1. W. MINES, B.A.Sc.,  
*Mechanical Engineer, Hoover & Mason.* Chicago, Ill.
- 3.\*J. M. ROBERTSON,  
*Consulting Engineer.* Ceristine Bldg., Montreal, P.Q.
1. R. K. RUSSEL,  
*Railway Contractor.* 611 Excelsior Life Bidg., Toronto, Ont.
- 1.\*F. N. SPELLER, B.A.Sc.,  
*Metallurgical Engineer, National Tube Co.* Pittsburgh, Pa.
1. H. R. SQUIRE, B.A.Sc., O.L.S. (deceased).
1. W. V. TAYLOR, O.L.S., A.M.E.I.C.,  
*Assist. Chief Engineer, Quebec Harbour Commission.* Quebec, P.Q.
- 1.\*R. B. WATSON (deceased).

## 1894.

- 3.\*R. W. ANGUS, B.A.Sc., Mem. Am. Soc. M.E. . . . .  
*Professor of Mechanical Engineering, University of Toronto.* Toronto, Ont.
1. H. F. BARKER,  
*Eng., Godson Contracting Co.* Toronto, Ont.

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 115

1894—Continued.

1. A. T. BEAUREGARD, B.A.Sc., Darien, Conn.
1. A. E. BERGEY, Pittsburgh, Pa.  
*Assoc. Professor, Carnegie Inst. of Technology.*
3. D. G. BOYD, Toronto, Ont.  
*Department of Lands and Mines, Parliament Buildings.*
3. W. A. BUCKE, B.A.Sc., Toronto, Ont.  
*Manager, Apparatus Sales Dept., Canadian General Electric Co.*
1. J. CHALMERS, O.L.S., M.E.I.C., 306 Royal Bank Bldg., Toronto
- 4.\*J. A. EWART, B.A.Sc., 415 Booth Bldg., Ottawa, Ont.  
*Architect.*
3. W. J. HERALD, B.A.Sc., 190 Whitney Ave., Sydney, N.S.
3. H. E. JOB, B.A.Sc., Hamilton, Ont.  
*Manager, Toronto and Hamilton Electric Co.*
1. S. M. JOHNSTON, B.A.Sc., B.C.L.S. Greenwood, B.C.
3. A. C. JOHNSTON, B.A.Sc., M.E., Chicago, Ill.  
*Vice-President, Link Belt Co.*
1. J. E. JONES, Toronto, Ont.
3. N. M. LASH, Montreal, P.Q.  
*Chief Engineer, Bell Telephone Co.*
- 1.\*A. L. McTAGGART, B.A.Sc., 703 Arch St., Pittsburg, Pa.  
*Mechanical Engineer.*
- 3.\*W. MINTY, B.A.Sc., Blackburn, Eng.  
*With Messrs. Yates & Thom, Ltd., Engineers.*
3. C. J. NICHOLSON, Hamilton, Ont.  
*Assistant Engineer, Toronto, Hamilton & Buffalo Ry.*
1. H. ROLPH, M.E.I.C., 341 Broadway, Lachine, P.Q.  
*President, John S. Metcalf Co., Ltd.*
1. J. D. SHIELDS, B.A.Sc., 48 Summerhill Gdns., Toronto, Ont.
1. ANGUS SMITH, C.E., O.L.S., A.M.E.I.C., Prince Albert, Sask.  
*City Engineer.*
3. A. K. SPOTON, Galt, Ont.  
*Chief Engineer, Goldie & McCulloch Engine Works.*
3. R. T. WRIGHT, B.A.Sc., East Pittsburgh, Pa.  
*Engineering Department, Westinghouse Machine Co.*

1895.

1. J. ARMSTRONG, B.A.Sc., LePas, Man.  
*Chief Engineer of the Hudson Bay Ry.*
3. A. E. BLACKWOOD, 30 Church St., New York  
*Manager, New York Office, Sullivan Machinery Co.*
1. E. J. BOSWELL, D.L.S., Montreal, Que.  
*With C. P. R.*
3. G. BREBNER (deceased).
3. W. M. BRODIE, B.A.Sc., 115 Lauder Ave., Toronto, Ont.  
*Manager, New York Office, Sullivan Machinery Co.*
3. L. L. BROWN, The Woolworth Bldg., New York  
*Vice-President, The Foundation Co.*
4. R. J. CAMPBELL, Chicago, Ill.  
*Artist Hawtin Studios.*
3. A. W. CONNOR, B.A., C.E., 34 Victoria St., Toronto, Ont.  
*Bowman & Connor.*
1. J. S. DOBIE, B.A.Sc., O. & D.L.S., Thessalon, Ont.  
*Engineer and Surveyor.*
1. F. W. GUERNSEY, Thompson, Nev.  
*Manager, Mason Valley Mines Co.*

\*Diploma with honours.

## 1895—Continued.

- 4.\*A. H. HARKNESS, B.A.Sc., Confederation Life Bldg., Toronto, Ont.  
*Consulting Structural Engineer, Harkness, Loudon and Hertzberg.*
3. H. S. HULL, B.A.Sc., Johnstown, Pa.  
*Structural Drawing, Cambria Steel Co.*
- 3.\*J. McGOWAN, B.A., B.A.Sc., Toronto, Ont.  
*Professor of Applied Mechanics, University of Toronto.*
3. W. N. MCKAY, Simcoe, Ont.  
*Manager of Bank of Hamilton.*
3. H. L. MCKINNON, B.A.Sc., Cleveland, Ohio  
*Brown Hoisting Machinery Co.*
1. W. W. MEADOWS, D. & O.L.S., Maple Creek, Sask.  
*Department of Public Works.*
1. F. J. ROBINSON, D. & O.L.S. (deceased).
3. F. T. STOCKING, Toronto, Ont.  
*Hydro-Electric Power Commission.*
3. R. C. C. TREMAINE, B.A.Sc. (deceased).

## 1896.

- 2.\*J. W. BAIN, B.A.Sc., Toronto, Ont.  
*Professor of Chemical Engineering, University of Toronto.*
2. L. T. BURWASH, M.E., 511 Ontario St., Toronto, Ont.
- 3.\*G. M. CAMPBELL, Lynn, Mass.  
*Electric Co.*
2. J. A. DECEW, B.A.Sc., 501-5th Ave., New York, N.Y.  
*President, Process Engineers, Ltd.*
- 3.\*H. P. ELLIOTT, B.A.Sc., E.E., London, Ont.  
*Consulting Electrical Engineer.*
3. W. C. GURNEY (deceased).
- 3.\*H. V. HAIGHT, B.A.Sc., Sherbrooke, P.Q.  
*Chief Engineer, Canadian Ingersoll Rand Co.*
1. W. F. LAING (deceased).
3. R. R. LAWRIE (deceased).
3. C. MACBETH, B.A.Sc. (deceased).
3. J. A. MACMURCHY, Pittsburg, Pa.  
*Chief Draftsman, Turbine Dept., Westinghouse Machine Co.,*
1. T. MARTIN, B.A.Sc., Revelstoke, B.C.  
*Division Engineer, C.P. Ry., Western Division.*
3. R. R. SCHEIBE, Toronto, Ont.  
*Sales Manager, Brigdens, Ltd.*

## 1897.

2. E. ANDREWS, B.Sc., A.M.I.C.E., Portmadoc, N. Wales  
*Resident Engineer, Maenofferen Slate Quarry Co., Ltd.*
- 2.\*J. A. BOW, Casilla, 230 Antofagasti, Chili, S.A.  
*c/o Andes Copper Mining Co.*
1. H. S. CARPENTER, B.A.Sc., O.L.S., Regina, Sask.  
*Superintendent of Highways, Department of Public Works.*
5. H. W. CHARLTON, B.A.Sc., New York, N.Y.  
*Patent Expert.*
4. \*E. A. FORWARD, M.E.I.C., Montreal, Que.  
*With A. W. Robertson, Ltd., Engineers and Contractors.*
- 3.\*A. T. GRAY, B.A.Sc., Schenectady, N.Y.  
*Designing Engineer on Steam Turbines, General Electric Co.*

\*Diploma with honours

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 117

1897—Continued.

3. W. A. B. HICKS,  
*Dominion Eng. Works.* Lachine, P.Q.
4. C. F. KING,  
*The Great West Perm. Loan Co.* 356 Main St., Winnipeg, Man.
1. H. W. PROUDFOOT (deceased).
- 2.\*A. H. A. ROBINSON, B.A.Sc., M.A.I.M.E.,  
*Mining Engineer, Department of Mines.* Ottawa, Ont.
4. W. F. SCOTT, Engineers' Club, Toronto
- 3.\*W. R. SMILEY, B.A.Sc.,  
*With Wellman-Seaver-Morgan Engineering Co.* Cleveland, Ohio.
- 2.\*W. W. STILL, B.A.Sc., O.L.S.,  
*Surveyor and Mining Engineer.* Sudbury, Ont.
- 1.\*M. B. WEEKES, B.A.Sc., D.L.S.,  
*Department of Public Works.* Regina, Sask.
1. E. A. WELDON,  
*Investment Broker.* 716 McIntyre Block, Winnipeg, Man.

1898.

1. W. H. BOYD, B.A.Sc.,  
*Geological Survey of Canada.* Ottawa, Ont.
2. W. E. H. CARTER, B.A.Sc., (deceased)
3. E. H. DARLING, M.E., A.M.E.I.C., 72 James St. N., Hamilton, Ont.  
*Consulting Engineer.*
1. W. F. GRANT, B.A.Sc. (deceased).
1. J. S. KORMANN, B.A.Sc., 472 Markham St., Toronto, Ont.
3. J. E. LAVAL (deceased).
4. D. MACKINTOSH, B.A.Sc., B.Arch., Bennington, Vt.  
*Chief Superintendent F. M. Andrews & Co., Metropolitan Tower.*
1. \*F. D. MCNAUGHTON, O.L.S.,  
*C.P.R., Dept. of Natural Resources.* Calgary, Alta.
1. J. H. SHAW, O.L.S., North Bay, Ont.  
*Surveyor and Engineer.*
3. A. E. SHIPLEY, B.A.Sc.,
- 3.\*F. C. SMALLPIECE, B.A.Sc., 3033 7th St. W., Calgary, Alta.  
*Chief Engineer, General Supplies Co.*
- 1.\*R. W. SMITH, P.L.S. (killed in action, France, 1916).
- 1.\*J. A. STEWART, M.A.,  
*Chief Engineer, Toronto Structural Steel Co.* Toronto, Ont.
- 1.\*H. L. VERCOE,  
3. T. A. WILKINSON,  
*Manager, Electro-Tin Products Co., Ltd.* Toronto, Ont.
3. D. A. WILLIAMSON, B.A.Sc.,  
*Structural Steel Engineer, Dept. of Public Works.* Brantford, Ont.
- Ottawa, Ont.

1899.

- 3.\*T. BARBER,  
*Hydraulic Engineer, Chas. Barber & Sons.* Meaford, Ont.
2. J. T. M. BURNSIDE, B.A.Sc. (deceased).
3. L. B. CHUBBUCK, B.A.Sc., E.E.,  
*Engineer, Canadian Westinghouse Co.* Hamilton, Ont.

---

\*Diploma with honours.

## 1899—Continued.

2. G. A. CLOTHIER,  
*Provincial Mining Engineer.* Prince Rupert, B.C.  
1. C. COOPER,  
2. R. W. COULTHARD, B.A.Sc.,  
*Department Soldiers' Civil Re-establishment.* Dalesboro, Sask.  
2. J. A. CRAIG, B.A.Sc.,  
2. J. C. ELLIOTT,  
3. W. E. FOREMAN, B.A.Sc.,  
*Sales Mgr. & Engineer, Railway & Power Eng. Corp. Ltd.* Toronto, Ont.  
3. E. GUY, B.A.Sc.,  
3.\*W. ALMON HARE, B.A.Sc., A.M.E.I.C.,  
1. R. LATHAM, B.A.Sc.,  
*Chief Engineer, T. H. & B. Ry.* Detroit, Mich.  
3. W. MONDS, B.A.Sc.,  
1. J. PATTERSON, B.A.,  
*Physicist, Dominion Observatory.* Hamilton, Ont.  
3. A. S. H. POPE, B.A.Sc.,  
2. G. E. REVELL, B.A.Sc. (killed in action, France, 1915).  
3.\*E. RICHARDS, B.A.Sc.,  
*Customs Appraiser.* Ottawa, Ont.  
3. G. A. SAUNDERS,  
*Asst. Engineer, Hydro-Electric Power Commission.* Toronto, Ont.  
1.\*T. SHANKS, B.A.Sc., D.L.S.,  
*Assistant Surveyor-General, Department of the Interior.* Ottawa, Ont.  
1.\*D. C. TENNANT, B.A.Sc.,  
*Struc. Eng., Dom. Bridge Co.* Montreal, Que.  
3. W. W. VANEVERY,  
*City Engineer.* Sault Ste. Marie, Ont.  
3. W. E. WAGNER, B.A.Sc.,  
*Manager, Smokeless Powder Division, Western Cartridge Co.* Springfield, Ill.  
2. G. H. WATT, D.L.S.,  
*Dominion Land Surveyor.* Ottawa, Ont.  
3. E. YEATES,  
*Yeates Machinery Co.* London, Ont.

## 1900.

1. J. L. ALLAN, M.E.I.C.,  
*Secretary, Dartmouth Development Co.* Dartmouth, N.S.  
2. E. G. R. ARDAGH, B.A.Sc.,  
*Associate Professor of Chemical Engineering, University of Toronto.* Toronto, Ont.  
3. J. A. BAIN (deceased).  
3. J. H. BARLEY, B.A.Sc.,  
*Canadian Westinghouse Electric and Manufacturing Co.* Hamilton, Ont.  
2.\*M. C. BOSWELL, M.A., Ph.D.,  
*Assoc. Professor of Organic Chemistry, University of Toronto.* Toronto, Ont.  
1. L. T. BRAY, D. & O.L.S.,  
*District Engineer.* Edmonton, Alta.  
3. J. CLARK,  
*Turnbull Elevator Mfg. Co.* Toronto, Ont.  
2. J. E. DAVISON, B.A.Sc.,  
*Engineering Staff, Canadian National Ry.* Winnipeg, Man.  
3. E. D. DICKINSON,  
*With General Electric Co.* Schenectady, N.Y.

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 119

1900—Continued.

- 3. G. W. DICKSON, B.A.Sc.,  
*With Riordan Pulp & Paper Co.* Hawkesbury, Ont.
- 2.\*H. A. DIXON, B.A.Sc., M.L.S., 828 Broadway, Winnipeg, Alta.  
*Chief Engineer, Western Lines Canadian National Railway.*
- 2. C. H. FULLERTON, O.L.S., 74 Normandy Blvd., Toronto, Ont.
- 3. W. S. GUEST, B.A.Sc.,  
*Lecturer in Electrical Engineering, University of Toronto.* Toronto, Ont.
- 3. W. HEMPHILL, B.A.Sc., E.E., 699-7th St., Buffalo, N.Y.  
*Buffalo General Electric.*
- 2. S. E. M. HENDERSON,  
*Canadian General Electric Co* Toronto, Ont.
- 3. J. A. HENRY,  
*Designing Engineer, General Electric Co.* Schenectady, N.Y.
- 2. H. S. HOLCROFT, B.A.Sc., D.L.S. (Died of wounds received in action, France, 1916).
- 3. H. A. JOHNSON,  
3. J. C. JOHNSTON,  
2.\*J. A. JOHNSTON, B.A.Sc.,  
2. R. E. McARTHUR,  
2. J. G. McMILLAN, B.A.Sc., M.E.,  
*Inspector of Mines.* Toronto, Ont.  
Portland, Oregon
- 3. L. HAUN MILLER,  
*Sales Agent, Bethlehem Steel Co.* Cleveland, Ohio
- 2. E. V. NEELANDS, B.A.Sc.,  
*Mining Engineer.* 92 Farnham Ave., Toronto, Ont.
- 1.\*E. H. PHILLIPS, D.L.S.,  
*Phillips, Stewart & Lee, Civil Engineers and Surveyors.* Saskatoon, Sask.
- 2. J. R. ROAF, B.A.Sc., Draemore Farm, Keating P.O., B.C.
- 3.\*C. H. E. ROUNTHWAITE,  
*Chief Draftsman, Algoma Central & Hudson Bay Ry.* Sault Ste. Marie, Ont.
- 2. H. W. SAUNDERS, B.A.Sc.,  
*Central Pocahontas Coal Co.* Welch, W.Va.
- 1. A. TAYLOR, D. & M.L.S.,  
*Engineer and Surveyor.* Portage la Prairie, Man.
- 1. W. C. TENNANT, B.A.Sc. (deceased).
- 2. S. M. THORNE, B.A.Sc.,  
*With Soldiers' Civil Re-establishment.* Toronto, Ont.
- 1. F. W. THOROLD, B.A.Sc., M.E.I.C.,  
*Consulting and Contracting Engineer.* 167 Avenue Rd., Toronto, Ont.
- 1. H. M. WEIR, B.A.Sc.,  
*City Engineer's Office.* Saskatoon, Sask.
- 3. F. D. WITHROW,  
*Patent Examiner, Dept. of Trade & Commerce.* Ottawa, Ont.

1901.

- 1. R. H. BARRETT, B.A.Sc., O.L.S. (deceased).
- 3. W. G. BEATTY,  
*Manager, Beatty Bros., Implement Manufacturers.* Fergus, Ont.
- 3. G. M. BERTRAM,  
*Lincoln Electric Co. of Canada, Ltd.* Toronto, Ont.
- 3. W. J. BOWERS (deceased).

\*Diploma with honours.

## 1901—Continued.

3. E. T. J. BRANDON, B.A.Sc., 190 University Ave., Toronto.  
*Electrical Engineer, Hydro-Electric Power Commission.* Ont,
3. W. P. BRERETON, B.A.Sc., Winnipeg, Man.  
*City Engineer.*
3. J. T. BROUGHTON, Columbus, Ohio.  
*Gen. Mgr., Factory Sales Co.*
- 3.\*W. G. CHACE, B.A.Sc., Toronto, Ont.  
*President, Canadian Lock Joint Pipe Co., Ltd.*
3. A. G. CHRISTIE, M.E. Baltimore, Md.  
*Assoc. Professor of Mechanical Engineering, Johns Hopkins University.*
3. J. R. COCKBURN, B.A.Sc., A.M.E.I.C., Toronto, Ont.  
*Associate Professor of Descriptive Geometry, University of Toronto.*
1. W. A. DUFF, Moncton, N.B.  
*Asst. Chief Eng., Can. Nat. Rys.*
- 2.\*D. E. EASON, B.A.Sc., Peterboro', Ont.  
*Division Engineer, Trent Valley Canal.*
- 1.\*S. GAGNE, B.A.Sc. (deceased).
3. N. R. GIBSON, B.A.Sc., Niagara Falls, N.Y.  
*Hydraulic Engineer, Niagara Falls Power Co.*
2. A. T. E. HAMER, Plato, Sask.
1. C. HARVEY, B.A.Sc., D.L.S., C.E., B.C.L.S., Hamilton, Ont.  
*Consulting Engineer and Surveyor.* 32 Carrick Ave., Hamilton, Ont.
2. F. C. JACKSON, Seaforth, Ont.  
*Jackson Construction Co.*
- 3.\*R. A. LAIDLAW, C.E. Houston, Texas  
*Engineer and Sales Agent, Trussed Concrete Steel Co.*
3. W. C. LUMBERS, 40 Jarvis St., Toronto, Ont.
2. A. C. MACDOUGALL, Poland  
*Anglo-Canadian Lumber Co.*
3. A. T. C. McMMASTER, B.A.Sc., Toronto, Ont.  
*Engineer and Contractor, Kerr & Chace.*
1. G. MACMILLAN, Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*
- 3.\*H. G. MCVEAN, B.A.Sc., 3120 Rae Street, Regina, Sask.
2. W. C. MATHESON, Joliette, Que.  
*With Mackenzie-Mann & Co.*
3. H. T. MIDDLETON, Palisade, N.J.
2. J. L. R. PARSONS, B.A., D.L.S., Regina, Sask.  
*Parsons Construction Co.*
1. G. H. POWER, Mail & Empire Bldg., Toronto, Ont.
- 3.\*H. W. PRICE, B.A.Sc., Toronto, Ont.  
*Professor of Electrical Engineering, University of Toronto.*
1. H. P. RUST, B.A.Sc., A.M.E.I.C., Philadelphia, Pa.  
*Engineer, J. P. Morris Co.*
3. M. V. SAUER, B.A.Sc., Toronto, Ont.  
*Engineer, Hydro-Electric Power Commission.*
3. W. H. STEVENSON, B.A.Sc., Monadnock Block, Chicago, Ill  
*Secretary, Power Plant Specialty Co.*
1. R. D. WILLSON (deceased)

\*Diploma with honours.

1902.

3.*H. G. BARBER,	Ottawa, Ont.
<i>Topographical Surveys Branch, Department of the Interior.</i>	
1. W. J. BLAIR, B.A.Sc., D. & O.L.S.,	104 Mountview Ave., Toronto, Ont.
3. J. M. BROWN,	Pittsburgh, Pa.
<i>With Westinghouse Machine Co., Steam Turbine Dept.</i>	
2. W. G. CAMPBELL,	Toronto, Ont.
<i>Campbell &amp; Lattimore.</i>	
2. A. R. CAMPBELL (deceased).	
3. C. G. CARMICHAEL (deceased).	
2.*W. CHRISTIE, B.A.Sc.,	Prince Albert, Sask.
<i>Dominion Land Surveyor.</i>	
2. F. T. CONLON (deceased).	
3. H. V. CONNOR,	Hamilton, Ont.
<i>Canadian Westinghouse Co.</i>	
2.*M. T. CULBERT (deceased).	
2. R. CUMMING,	Lumsden Bldg., Toronto, Ont.
<i>c/o Roger Mills &amp; Co.</i>	
1. W. E. DOUGLAS, B.A.,	152 Bay St., Toronto, Ont.
<i>Contractor.</i>	
3.*R. J. DUNLOP,	37 Ross St., Toronto, Ont.
<i>National Refining Co. Ltd.</i>	
2. W. M. EDWARDS, B.A.Sc.,	Foremost, Alta.
<i>c/o Stacey Lumber Co.</i>	
3. W. ELWELL (deceased).	
2. J. M. EMPEY, B.A.Sc., O. & D.L.S.,	Kemptville
<i>Dept. of Highways.</i>	
2.*D. L. H. FORBES, M.E.,	Swastika, Ont.
<i>Manager, Teck-Hughes Gold Mine.</i>	
1.*A. E. GIBSON, B.A.Sc.,	Toronto, Ont.
<i>Roger Miller &amp; Sons, Engineers and Contractors.</i>	
3. A. C. GOODWIN,	Toronto, Ont.
<i>With Hydro-Electric Power Commission.</i>	
3. C. P. HENWOOD,	McKeesport, Pa.
<i>Draftsman, National Tube Co.</i>	
3. D. M. JOHNSTON,	Toronto, Ont.
<i>With Hydro-Electric Power Commission.</i>	
2. R. H. KNIGHT, B.A.Sc., D.L.S.,	Edmonton, Alta.
<i>Driscoll &amp; Knight, Engineers and Surveyors.</i>	
5.*F. L. LANGMUIR, B.A.Sc., Ph.D.,	800 King St. W., Toronto,
<i>Vice-Pres., M. Langmuir Mfg. Co.</i>	[Ont.]
3. A. H. McBRIDE, B.A.Sc.,	Toronto, Ont.
<i>Assistant Engineer, Hydro-Electric Power Commission.</i>	
3. J. T. MACKAY, M.D.,	114-3rd Ave. N., Saskatoon, Sask.
1. A. L. MACLENNAN, D.L.S.	Toronto, Ont.
<i>Department Soldiers' Civil Re-establishment.</i>	
3. J. F. S. MADDEN,	Toronto, Ont.
<i>Hydro-Electric Power Commission.</i>	
3.*C. H. MARRS, C.E.,	Hamilton, Ont.
<i>Hamilton Bridge Works.</i>	
3. P. MATHISON, B.A.Sc.,	Box 47 No. 2, Chico, California
3. R. S. MENNIE,	Pittsburgh, Pa.
<i>With Crucible Steel Co. of America.</i>	

\*Diploma with honours.

## 1902—Continued.

2. H. H. MOORE, D.L.S., A.M.E.I.C., 202 I.O.O.F. Bldg., Calgary, Alta.  
*Dominion Land Surveyor and Engineer.*
- 1.\*T. S. NASH, Ottawa, Ont.  
*Topographical Surveys Branch, Department of the Interior.*
1. G. G. POWELL, B.A.Sc., Toronto, Ont.  
*Assist. City Engineer.*
- 1.\*W. F. RATZ, D.L.S. (deceased).
3. H. D. ROBERTSON, B.A.Sc., Winnipeg, Man.
- 3.\*D. SINCLAIR, B.A.Sc. (deceased).
- 2.\*I. J. STEELE, D.L.S., Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*
3. W. H. SUTHERLAND, B.A.Sc., Montreal, Que.  
*Assistant Chief Engineer, Montreal Water and Power Co.*
- 3.\*THOS. TAYLOR, C.E., Toronto, Ont.  
*Des. and Const. Engineer, Bloor Street Viaduct.*
- 2.\*C. M. TEASDALE, Le Pas, Man.  
*Private Practice.*
3. A. A. WANLESS, Route B, Miami, Fla.  
*Florida East Coast Hotel Co.*
3. H. J. ZAHN, B.A.Sc., Penobscot Bldg., Detroit, Mich.  
*Gabriel Steel Co.*

## 1903.

3. H. G. ACRES, Toronto, Ont.  
*Hydraulic Engineer, Hydro-Electric Power Commission.*
1. J. G. R. ALISON, Niagara Falls, Ont.  
*With Hydro-Electric Power Commission.*
- 3.\*H. H. ANGUS, B.A.Sc., 217 Continental Life Bldg., Toronto, Ont.  
*Consulting Engineer.*
3. J. A. BEATTY, Peterboro', Ont  
*Morrow & Beatty, Contractors.*
- 3.\*J. BRESLOVE, 985 Union Arcade Bldg., Pittsburgh, Pa  
*Consulting Engineer.*
2. J. H. BURD, O., D., S. & A. L. S., C.E.,  
*Engineer and Surveyor.*
- 1.\*E. L. BURGESS, D.L.S., Kamloops, B.C.  
*Burgess & Taggart, Surveyors and Engineers.*
2. N. A. BURWASH, B.A.Sc., Toronto, Ont.  
*Dept. of Public Highways.*
4. J. B. CHALLIES, C.E., Ottawa, Ont.  
*Sup't Water Power Branch, Dep't of the Interior.*
1. F. F. CLARKE, D. & O.L.S., A.M.E.I.C.,  
*Chief Land Surveyor, Canadian National Rys.*
2. C. L. COULSON, Welland, Ont.  
*City Engineer.*
- 3.\*A. E. DAVISON, B.A.Sc., C.E. Toronto, Ont.  
*Asst. Eng., Hydro-Electric Power Commission.*
3. C. J. FENSON, B.A.Sc., M.E., Hamilton, Ont.  
*Works Engineer, Otis-Fensom Elevator Co.*
- 2.\*E. O. FUCE, O.L.S., 84 King Street E., Toronto, Ont.  
*Engineer and Surveyor.*

\*Diploma with honours.

1903—Continued.

- 3.\*F. A. GABY, B.A.Sc.,  
*Chief Engineer, Hydro-Electric Power Commission.* Toronto, Ont.
1. J. C. GARDNER, B.A.Sc.,  
*Consulting Engineer* Niagara Falls, Ont.
3. R. E. GEORGE (deceased).
- 1.\*P. GILLESPIE, B.A.Sc., C.E.  
*Professor of Applied Mechanics, University of Toronto.* Toronto, Ont.
1. W. A. GOURLAY,  
*Chief Engineer, Dominion Public Works Dept.* 2099 Granite St., Victoria, B.C.
2. J. F. HAMILTON, B.A.Sc., C.E.,  
*Hamilton & Young, Dominion Land Surveyors and Engineers.* Lethbridge, Alta.
2. G. S. HANES, B.A.Sc., O.L.S., 144, 3rd St., W. North Vancouver, B.C.  
*Member Legislative Assembly.*
2. F. Y. HARCOURT, B.A.,  
*Engineer, Public Works Dept.* Port Arthur, Ont.
1. L. J. HAYES,  
 1.\*F. D. HENDERSON, Secy. Board of Examiners for D.L.S., Ottawa, Ont.  
*Topographical Surveys Branch, Department of the Interior.*
- 5.\*J. A. HORTON,  
*Chemist, Lever Brothers.* Winnipeg, Man.
3. J. G. JACKSON,  
*Manager, Public Utilities.* Chatham, Ont.
3. C. K. JOHNSTON,  
*Merchant.* Pefferlaw, Ont.
1. H. JOHNSTON, C.E., O.L.S.,  
*Consulting Engineer.* Kitchener, Ont.
3. A. G. LANG,  
 190 University Ave., Toronto, Ont.  
*Asst. Eng., Hydro-Electric Power Commission.*
- 1.\*A. J. LATORNELL, B.A.Sc. (died of wounds received in action, 1917).
- 1.\*H. J. MCCLUSKIE, B.A.Sc., O.L.S.,  
 North Bay, Ont.
3. J. A. MCFARLANE, B.A.Sc.,  
*Chief Draftsman, Hamilton Bridge Works Co.* Hamilton, Ont.
- 1.\*A. L. MCNAUGHTON,  
 5.\*F. G. MARRIOTT, B.A.Sc.,  
*Chemist and Supt. Asphalt Plant, City Testing Laboratory.* Toronto, Ont.
- 3.\*C. A. MAUS,  
*Glenco Elec. Eng. Co. Ltd.* 421-15 St. N.W., Calgary, Alta.
- 3.\*M. L. MILLER,  
*Edison Electric Co.* 845 Canton Ave., Detroit, Mich.
3. P. H. MITCHELL, E.E.,  
*Consulting Electrical Engineer, Bank of Hamilton Building.* Toronto, Ont.
2. R. H. MONTGOMERY, B.A.Sc., O. and D.L.S.,  
*Montgomery & Morrillo, Eng. Surveyors.* 75 W. 19th St., Prince Albert, Sask.
1. F. A. Moore,  
 259 Russell Hill Rd., Toronto, Ont.
3. E. E. MULLINS,  
*Supt. Motive Power, Northern Ry. Co.* Port Limon, Costa Rica.
3. I. H. NEVITT, B.A.Sc.,  
*Sup't and Asst. Engineer, Main Sewage Dept., Dept. of Works.* Toronto, Ont.
1. E. W. OLIVER, B.A.Sc., C.E.,  
*Assistant to Chief Engineer, Canadian National Ry. System.* Toronto, Ont.
3. J. P. OLIVER,  
 3. J. D. PACE, B.A.Sc.,  
*With Hydro-Electric Power Commission.* Saskatoon, Sask. Toronto, Ont.

## 1903—Continued.

3. B. B. PATTEN, B.A.Sc.,  
*With Welland Ship Canal.* St. Catharines, Ont.  
2. D. H. PHILP,  
*With Hydro-Electric Power Commission.* Niagara Falls, Ont.  
3.\*D. H. PINKNEY,  
*Mechanical Engineer, National Tube Co.* Lorain, O.  
2. T. H. PLUNKETT, B.A.Sc.,  
*Dominion Land Surveyor.* Meaford, Ont.  
1. D. F. ROBERTSON, D.L.S.,  
*Dept. of Indian Affairs.* Ottawa, Ont.  
3.\*H. M. SCHEIBE, B.A.Sc., Boston, Mass.  
1.\*H. L. SEYMOUR, B.A.Sc., D.L.S.,  
*Barber, Wynne-Roberts & Seymour.* 40 Jarvis St., Toronto Ont.  
1. J. H. SMITH, D. & O.L.S., 10204 124 St., Edmonton, Alta.  
*Engineer and Surveyor.*  
3. H. G. SMITH, B.A.Sc. (deceased).  
3. S. L. TREES, B.A.Sc., Whitby, Ont.  
*Manager, Samuel Trees & Co.*  
2. J. E. UMBACH, Victoria, B.C.  
*Surveyor General, British Columbia.*  
1. J. WALDRON, D.L.S., Hammond Bldg., Moose Jaw, Sask.  
*Engineer and Surveyor.*  
3.\*S. B. WASS, Moncton, N.B.  
*Supt. St. John & Quebec R.R.*  
3. J. A. WHELIHAN, Box 165, Regina, Sask.  
3. H. F. WHITE, London, Ont.  
*Asst. Supt. Geo White & Sons Co., Ltd.*  
2.\*C. G. WILLIAMS, B.A.Sc., Timmins, Ont.  
*Supt., Hollinger Consolidated Gold Mines, Ltd.*  
1.\*N. D. WILSON, B.A.Sc., Toronto, Ont.  
*Toronto Harbour Commission.*  
1.\*C. R. YOUNG, B.A.Sc., C.E., M.E.I.C., Toronto, Ont.  
*Associate Professor in Structural Engineering, University of Toronto.*

## 1904.

- 3.\*J. H. ALEXANDER, B.A., C.E., A. M. Am. Soc. C.E., Winnipeg, Man.  
*Engineer and Contractor.*  
3.\*J. H. BARRETT, Mail Bldg., Toronto, Ont.  
3. M. B. BONNELL, Bobcaygeon, Ont.  
3. T. D. BROWN, B.A.Sc., Calgary, Alta.  
*Canadian Fairbanks Co.*  
1. R. J. BURLEY, 479 Albert St., Ottawa, Ont.  
*Divisional Engineer Reclamation Service, Dept. of the Interior.*  
3. F. W. BURNHAM, B.A.Sc., Hamilton, Ont.  
*Sales Dept., Can. Westinghouse.*  
3. J. W. CALDER, B.A.Sc., Swift Current, Sask.  
*City Engineer.*  
1. N. C. CAMERON, A.M.E.I.C., 4172 Dorchester St., Montreal, Que.  
*Engineer, Imperial Tobacco Co.*  
1. A. J. CAMPBELL, B.A.Sc., Sidney, B.C.  
3.\*A. M. CAMPBELL, B.A.Sc., M.E. Granville, Ohio.  
2. C. A. CHILVER, Walkerville, Ont.  
*Contractor.*

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 125

1904—Continued.

2. H. L. CHILVER, D.L.S., <i>City Engineer's Dep't., City Hall.</i>	Windsor, Ont.
1. U. W. CHRISTIE, B.A.Sc., O.L.S., <i>Wheelock &amp; Christie, Civil Engineers.</i>	Orangeville, Ont.
2. P. C. COATES, B.A.Sc., <i>D. and B. C. Land Surveyor.</i>	Victoria, B.C.
1. S. B. CODE, O.L.S., <i>Town Engineer.</i>	Smith's Falls, Ont.
1.*T. F. CODE, B.A.Sc. (deceased).	
1.*W. A. COWAN, (deceased).	
3.*S. E. CRAIG, B.A.Sc., <i>Manager, Montreal Br., Canadian Inspection and Testing Co. Ltd.</i>	Montreal, Que.
1.*S. R. CRERAR, B.A.Sc., O.L.S., <i>Assistant Professor in Surveying, University of Toronto.</i>	Toronto, Ont.
3. W. M. CURRIE, <i>Hamilton Tar-Ammonia Co.</i>	Hamilton, Ont.
3. H. H. DEPEW,	11412-93rd St., Edmonton, Alta.
2. A. J. ELDER, <i>Topographical Surveys Branch, Department of the Interior.</i>	Ottawa, Ont.
2. J. G. FLECK,	54 Cordova St. E., Vancouver, B.C.
1.*A. L. FORD, B.A.Sc., <i>Dept. of Int., Reclamation Service.</i>	513-8th Ave. West, Prince Rupert, B.C.
3. W. S. GIBSON, B.A.Sc.,	38 Park Rd., Toronto, Ont.
1. J. N. GOODALL, <i>Gray-Dort Motors, Ltd.</i>	Chatham, Ont.
1. J. P. GORDON,	11 Tyndall Ave., Toronto, Ont.
3. W. W. GRAY, B.A.Sc., <i>Inspector, Fairbanks Morse Co.</i>	Toronto, Ont.
3. A. GRAY, B.A.Sc. (deceased).	
3. W. K. GREENWOOD, B.A.Sc., (deceased).	
1. L. D. HARA, <i>Assistant Engineer, Welland Canal Office.</i>	St. Catharines, Ont.
3. C. J. HARRIS, B.A.Sc., <i>Russell Motor Car Co.</i>	Toronto, Ont.
1. J. B. HERON, B.A.Sc.,	45 Benlamond Ave., Toronto Ont.
1. E. M. M. HILL, <i>Engineering Dept. Canadian National Railway.</i>	Edmonton, Alta.
2. S. N. HILL, C.E., <i>Topographical Surveys Branch, Department of the Interior.</i>	"The Alexandra", Ottawa, Ont.
2. C. J. INGLES,	393 Keele St., Toronto, Ont.
1. E. A. JAMES, B.A.Sc., C.E., <i>President, E. A. James Co., Ltd.</i>	36 Toronto St., Toronto, Ont.
1. P. V. JERMYN, B.A.Sc., <i>Harkness, Loudon &amp; Hertzberg.</i>	Toronto, Ont.
3. W. S. H. KEEFE, <i>Manager, Light, Heat and Power Co.</i>	Fort Covington, N.Y.
3. W. J. LARKWORTHY (deceased).	
3. O. B. McCUAIG, B.A.Sc.,	Penn Yann, N.Y.
1. G. G. McEWEN, B.A.Sc., <i>Water Power Br.</i>	Ottawa, Ont.
1.*W. G. MCFARLANE, B.A., B.A.Sc., <i>Brandon Bread Co.</i>	95 Coleman Cr., Toronto, Ont.

\*Diploma with honours.

## 1904—Continued.

3.*C. P. MCGIBBON, B.A., <i>Canadian Westinghouse Co.</i>	Hamilton, Ont.
3. C. MCKAY, B.A.Sc. (deceased).	
1. D. McMILLAN, <i>With C.N.R.</i>	Edmonton, Alta.
3. G. J. MANSON, M.E.,	Hawkesbury, Ont.
1.*W. N. MOORHOUSE, <i>George &amp; Moorhouse, Architects.</i>	Toronto, Ont.
3. E. E. MOORE, <i>Hydro-Electric Power Commission.</i>	Toronto, Ont.
3. W. H. MUNRO, A.M.E.I.C., <i>Hydro-Electric Eng., Vickers Ltd. of England.</i>	N. Nigeria, Africa
3. G. PACE, B.A.Sc., <i>With Hydro-Electric Power Commission.</i>	Toronto, Ont.
3. W. S. PARDOE, B.A.Sc., <i>Asst. Prof. in Civil Engineering, University of Pennsylvania.</i>	Philadelphia, Pa.
3. J. PARIS, <i>c/o S. B. Clement, T.N.O. Ry.</i>	North Bay, Ont.
1. J. PARKE, B.A.Sc., (deceased).	
3. W. J. PEAKER, <i>Topographical Surveys Branch, Dept. of the Interior.</i>	Ottawa, Ont.
3.*A. E. PICKERING, <i>Manager, Tagona Light and Power Co.</i>	Sault Ste. Marie, Ont.
1. D. L. C. RAYMOND, B.A.Sc., <i>The Raymond Construction Co., Ltd.</i>	Montreal, Que.
1. F. B. REID, B.A.Sc., <i>Astronomical Surveys Branch, Dept. of the Interior.</i>	Ottawa, Ont.
3.*M. R. RIDDELL, B.A.Sc., <i>Asst. to the Director, Eng. Expt. Station, University of Illinois.</i>	Urbana, Ill.
1. L. H. ROBINSON, C.E.,	Box 745, Truro, N.S.
3. G. S. ROXBURGH, B.A.Sc., <i>Manager, Fetherstonhaugh &amp; Co., Patent Solicitors and Engineers.</i>	Winnipeg, Man.
2. F. N. RUTHERFORD, B.A.Sc., <i>Engineer and Land Surveyor.</i>	24 Queen St., St. Catharines, Ont.
3. P. M. SAUDER, <i>Divisional Engineer, Lethbridge Northern Irrigation District.</i>	Lethbridge, Alta.
1.*J. D. SHEPLY, B.A.Sc., D.L.S. <i>District Surveyor and Engineer.</i>	N. Battleford, Sask.
3. F. W. SLATER, B.A.Sc., <i>With General Electric Co.</i>	Schenectady, N.Y.
3.*R. S. SMART, M.E., <i>Manager, Fetherstonhaugh &amp; Co., Patent Solicitors and Engineers.</i>	Ottawa, Ont.
1. D. A. SMITH, B.A.Sc., D. & S. L. S., <i>c/o Phillips &amp; Smith.</i>	Regina, Sask.
3. W. J. SMITHER, B.A.Sc., <i>Lecturer in Structural Engineering, University of Toronto.</i>	Toronto, Ont.
3. S. E. THOMSON, B.A.Sc., <i>Engineering Staff, Electrical Development Co.</i>	Niagara Falls, Ont.
3. C. J. TOWNSEND, B.A.Sc., C.E. <i>Russell &amp; Townsend.</i>	344 St. Clarens Ave., Toronto, Ont.
1. D. T. TOWNSEND, B.A.Sc., O.L.S., <i>Chief Surveyor, Dept. of Natural Resources, C.P.R.</i>	Calgary, Alta.
1. A. V. TRIMBLE, B.A.Sc., <i>Hydro-Electric Power Commission.</i>	Toronto, Ont

\*Diploma with honours.

## 1904—Continued.

3. B. B. TUCKER, B.A.Sc., Morrisburg, Ont.  
*Resident Engineer, New York and Ontario Power Co.*
- 2.\*E. WADE, B.A., Welland, Ont.  
*Builder.*
- 1.\*E. W. WALKER, B.A.Sc. (deceased).
3. J. P. WATSON, B.A.Sc., Three Rivers, Que.  
*With Wayagamack Pulp & Paper Co.*
1. J. M. WEIR, 60 Chester Ave., Toronto, Ont.  
*Weir Bros., Apiarists.*
- 1.\*A. F. WELLS, O.L.S., B.A.Sc., 701 Confederation Life Bldg.,  
*Wells & Gray, Ltd., Engineers and Contractors.* [Toronto, Ont.]
1. W. R. WORTHINGTON, B.A.Sc., 555 Markham St., Toronto, Ont.  
*Consulting Engineer.*
3. W. F. WRIGHT, B.A.Sc., 86 Richmond St. E., Toronto, Ont.  
*District Manager, Eugene F. Phillips Electrical Works, Ltd.*

## 1905.

2. H. W. ARENS (deceased).
3. R. H. ARMOUR, 234 Jarvis Street, Toronto, Ont.
- 3.\*C. B. AYLESWORTH, Hamilton, Ont.  
*Draftsman, Canadian Westinghouse Co.*
- 1.\*W. BARBER, B.A.Sc., 10 Adelaide St. East, Toronto, Ont.  
*Contractor, Kilmer & Barber.*
- 2.\*W. A. BEGG, B.A.Sc., Regina, Sask.  
*Department of Public Works.*
- 3.\*G. G. BELL, \* Sewickley, Pa.
1. J. C. BOECKH, Toronto, Ont.  
*With Boeckh Brush Co.*
3. W. M. BRISTOL, Halifax, N.S.  
*Canadian Westinghouse Co.*
2. W. C. CAMPBELL, Keene, Ont.
3. W. R. CARSON, Cleveland, O.  
*Engineering Dept., Grasselli Chemical Co.*
1. A. V. CHASE, Orillia, Ont.
3. S. R. A. CLEMENT, 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
6. R. M. A. COLEMAN, Copper Cliff, Ont.
3. T. E. CORRIGAN, New Westminster, B.C.  
*Electrical Contractor.*
- 1.\*N. L. R. CROSBY, B.A.Sc. 95 King St. E., Toronto, Ont.  
*Contracting Engineer, Toronto Steel Const. Co.*
1. G. H. FERGUSON, B.A.Sc., 83 Ballantyne Ave. N., Montreal W.
3. H. S. FIERHELLER, B.A.Sc. (deceased).
3. F. W. HARRISON, New York, N.Y.  
*Engineer, H. D. Best Co.*
1. M. C. HENDRY, B.A.Sc., Ottawa, Ont.  
*Water Power Branch, Dept. of Interior.*
2. C. S. L. HERTZBERG, Toronto, Ont.  
*Harkness, Loudon & Hertzberg.*
- 3.\*W. G. HEWSON, B.A.Sc., Toronto, Ont.  
*Hydro Electric Power Commission.*

\*Diploma with honours.

## 1905—Continued.

1. G. S. JONES,  
*Topographical Surveys Br., Dept. of Interior.* Ottawa, Ont.
- 3.\*G. KRIBS,  
*Manager, Hespeler Mfg. Co.* Hespeler, Ont.
2. P. A. LAING, Dundas, Ont.
1. A. LATORNELL, B.A.Sc.,  
*Engineer, Sewer Department, City Hall.* Toronto, Ont.
3. J. W. LEIGHTON,  
*President, Leighton-Jackes Mfg. Co.* Toronto, Ont.
- 1.\*T. R. LOUDON, B.A.Sc.,  
*Associate Professor of Applied Mechanics, University of Toronto.* Toronto, Ont.
3. S. E. McGORMAN,  
*Asst. Engineer, Canadian Bridge Co.* Walkerville, Ont.
- 1.\*W. W. MCGREGOR (deceased).
2. D. W. MCKENZIE,  
*Draftsman, Engineering Dept. C.N. Ry.* Winnipeg, Man.
- 3.\*C. A. MCLEAN.  
*Masco Co.* Toronto, Ont.
2. W. N. MCLEAN,  
Erin, Ont.
3. F. G. MACE,  
*Patent Examiner, Dept. of Trade & Commerce.* Ottawa, Ont.
3. R. W. MOFFATT, B.A.Sc.,  
*University of Manitoba.* Winnipeg, Man.
3. L. W. MORDEN,  
40 Forest Ave., Hamilton, Ont.
3. G. R. MUNRO, B.A.Sc., (deceased).
- 3.\*W. G. NICKLIN, B.A.Sc.,  
*Secy., Nicklin Tanning Co.* 4502 N. Fair Ave., St. Louis
1. E. D. O'BRIEN,  
*Chief Engineer, Halifax Shipyards, Ltd., and Dartmouth Marine Ry.* Halifax, N.S.
- 1.\*B. B. PATTEN, B.A.Sc.,
1. E. P. A. PHILLIPS, B.A.Sc., O.L.S.,  
*Phillips & Benner.* Port Arthur, Ont.
1. W. B. PORTE,  
297 Wolfe St., London, Ont.
2. E. F. PULLEN,  
*President, Alexo Coal Mining Co.* Alexo, Ont.
2. G. L. RAMSEY, B.A.Sc.,  
*Ontario Land Surveyor.* Sault Ste. Marie, Ont.
1. G. W. RAYNER,  
*Ontario Rock Co.* Toronto, Ont.
- 3.\*R. B. ROSS (deceased).
5. T. E. ROTHWELL, B.A.Sc.,  
*Provincial Assay Office.* Toronto, Ont.
- 2.\*G. S. SCOTT,  
*Geologist, International Nickel Co.* Copper Cliff, Ont.
3. H. V. SERSON,  
Arnprior, Ont.
3. C. H. SHIRRIFF, B.A.Sc.,  
*Chemist, Imperial Extract Co.* Toronto, Ont.
- 3.\*C. E. SISSON,  
*Canadian Gen. Electric Co.* Peterboro', Ont.
1. D. L. N. STEWART, B.A.Sc.,  
459 Theodore St., Ottawa
1. M. A. STEWART,  
*Assistant Engineer, Roadway Dept., City Hall.* Toronto, Ont.
- 3.\*W. F. STUBBS,  
*Assistant Engineer, Goldie & McCulloch Co.* Galt, Ont.

\*Diploma with honours.

## 1905—Continued.

1. N. H. STURDY,  
*Chief Engineer, Truscon Steel Co.* Youngstown, O.  
1. W. G. SWAN, B.A.Sc., C.E.,  
*Chief Engineer, Vancouver Harbour Commission.* Vancouver, B.C.  
1.\*F. H. SYKES, O. & D.L.S.,  
*City Architect's Dept., City Hall.* Toronto, Ont.  
3. L. R. THOMSON, B.A.Sc.,  
*Secretary, Lignite Utilization Board.* Montreal, Que.  
3. E. D. TILLSON, B.A.Sc.,  
502 Webster Building, Chicago, Ill.  
1.\*J. J. TRAILL, B.A.Sc., C.E.,  
*With Hydro-Electric Power Commission.* Toronto, Ont.  
1.\*W. M. TREADGOLD, B.A.,  
*Associate Professor in Surveying, University of Toronto.* Toronto, Ont.  
3. W. E. TURNER, B.A.Sc.,  
*Villadsen Bros. Construction Co.* Salt Lake City, Utah  
3. A. E. UREN,  
*Editor, Acton Publishing Co.* Toronto, Ont.  
3. J. M. VAUGHAN,  
16 Summerhill Gardens, Toronto, Ont.  
*Contractor.*  
1. H. L. WAGNER, B.A.Sc.,  
*Instructor, Invalided Soldiers' Commission.* 76 Mavety St., Toronto, Ont.  
2. W. H. YOUNG, B.A.Sc., D.L.S., Youngstown, Alta.

## 1906.

1. F. ALPORT, B.A.Sc., D.L.S., Orillia, Ont.  
3.\*W. L. AMOS,  
*Hydro-Electric Power Commission.* Toronto, Ont.  
1. A. H. ARENS, Orillia, Ont.  
3.\*J. C. ARMER, B.A.Sc.,  
*Vice-President, Ewart, Jacob & Byam.* Toronto, Ont.  
1. M. H. BAKER, B.A.Sc.,  
*With Irish & Maulson.* Toronto, Ont.  
3. F. W. BALDWIN,  
*With Dr. Graham Bell.* Hammondsport, N.Y.  
2. E. W. BANTING, B.A.Sc.,  
*Lecturer in Surveying, University of Toronto.* Toronto, Ont.  
3. F. BARBER,  
40 Jarvis St., Toronto, Ont.  
*Barber, Wynne-Roberts & Seymour.*  
2. M. BATES, B.A.Sc. (deceased).  
2. J. P. BELLISLE (deceased).  
3.\*H. H. BETTS, B.A.Sc., Plaza Cataluna 2, Barcelona, Spain  
*Riegos y Fuerza del ebro.*  
5.\*D. E. BEYNON, B.A.Sc.,  
*General Supt., Dunlop Tire and Rubber Goods Co.* Toronto, Ont.  
2. G. W. BISSETT, (deceased)  
3. W. C. BLACKWOOD, B.A.Sc., Guelph, Ont.  
*Professor of Physics, Ontario Agricultural College.*  
3. H. E. BRANDON, B.A.Sc.,  
*With Hydro-Electric Power Commission.* Toronto, Ont.  
1. M. E. BRIAN, B.A.Sc., O.L.S., A.M.E.I.C.,  
*City Engineer.* Windsor, Ont.  
2. F. C. BROADFOOT,  
*Rallins, Burdick & Hunter.* Coleman Bldg., Seattle, Wash.

\*Diploma with honours.

## 1906—Continued.

2. T. W. BROWN, B.A.Sc., D., S. & A.L.S., A.M.E.I.C.,  
*Brown & Loucks, Civil Engineers.* Saskatoon, Sask.  
 1.\*A. E. K. BUNNELL, B.A.Sc., Toronto, Ont.  
*Baldwin's Can. Steel Corp., Ashbridges Bay.*  
 3. F. M. BYAM, 206 Excelsior Life Bldg., Toronto, Ont.  
*Ewart, Jacob & Byam.*  
 3. A. CAMERON, Winnipeg, Man.  
*Draftsman, G.T.P.*  
 3. A. W. CAMPBELL, B.A.Sc., 2535 Eighth Ave., W., Vancouver, B.C.  
 I. M. J. CARROLL, Ottawa, Ont.  
*Topographical Surveys Branch, Department of the Interior.*  
 3.\*R. E. C. CHADWICK, Montreal, Que.  
*Eastern Manager, The Foundation Co., Ltd., of New York.*  
 1.\*G. T. CLARK, B.A., C.E., Toronto, Ont.  
*Designing Engineer, Toronto Harbour Commissioners.*  
 3.\*G. A. COLHOUN, Hamilton, Ont.  
*Draftsman, The Hamilton Bridge Works Co., Ltd.*  
 1.\*W. A. M. COOK, B.A.Sc., Toronto, Ont.  
*Designing Engineer, Board of Education.*  
 1.\*E. L. COUSINS, B.A.Sc., Toronto, Ont.  
*General Manager, Harbour Commission.*  
 4. A. G. CREIGHTON, 140 State St., New London, Conn.  
 4. W. N. DANIELS, Noble Road, Jenkintown, Pa.  
 3.\*N. P. F. DEATH, B.A.Sc., Toronto, Ont.  
*Superintendent, Leaside Engineering Corp.*  
 3. C. S. DUNDASS, B.A.Sc., Lachine, Que.  
*With Dominion Bridge Co.*  
 3. S. L. FEAR, 659 Spadina Ave., Toronto, Ont.  
*Mech. and Elec. Eng. and Contracting.*  
 5.\*C. C. FORWARD, Halifax, N.S.  
*Dept. of Health, Food & Drugs Lab., Dom. Govt.*  
 5. C. W. GRAHAM, B.A.Sc. (deceased).  
 3. J. GRAY, 686 St. Clarens Ave., Toronto, Ont.  
*Gray Ball Bearing Co.*  
 1.\*P. W. GREENE, Box 65, Port Credit, Ont.  
 3. C. B. HAMILTON, B.A.Sc., C.E. M.A.S.M.E., M.E.I.C., A.M.A.I.E.E.,  
*President, Hamilton Gear Co., Ltd.* M.S.A.E., Toronto, Ont.  
 1.\*A. L. HARKNESS, B.A.Sc., 320 Legauchetiere, Montreal  
*c/o Eng. & Inspection Co.*  
 1. E. HARRISON, B.A.Sc., 513 Beveridge Blk., Calgary, Alta.  
*Consulting Civil Engineer and Surveyor.*  
 1.\*R. L. HARRISON, Toronto, Ont.  
*Resident Engineer, C.N.R.*  
 3. J. C. HARTNEY, B.A.Sc. (Killed in action, France, 1918).  
 1. S. HETT, B.A.Sc., Prince Albert, Sask.  
*Hett & Sibbald.*  
 3. C. R. HILLIS. (Killed in action, France, 1918).  
 3. C. W. HOOKWAY, B.A.Sc., Toronto, Ont.  
*Westinghouse Canadian Co.*  
 3. R. H. HOPKINS, B.A.Sc., Toronto, Ont.  
*With Canadian General Electric Co.*  
 1.\*R. S. HOUSTON, Winnipeg, Man.  
*Chief Engineer, Vulcan Iron Works.*

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 131

1906—Continued.

- 2.\*W. HUBER,  
*Huron Construction Co.* Kincardine, Ont.
- 3.\*A. H. HULL, B.A.Sc., 190 University Ave., Toronto, Ont.  
*Engineer, Hydro-Electric Power Commission.*
3. W. C. JEPSON,  
*Welland Canal Office.* Niagara Falls, Ont.
- 1.\*C. JOHNSTON, B.A.Sc.,  
*Engineer, Toronto and York Radial Ry.* Oakville, Ont.
1. G. R. JONES, B.A.Sc., Chung-King, China.  
*Business Agent, Canadian Methodist Mission.*
3. T. JONES, B.A.Sc. (Killed in action, France, 1916).
- 1.\*A. E. JUPP, B.A.Sc., 47 Sparkhall Ave., Toronto, Ont.  
*Mgr. and Sec., A. E. Jupp Const. Co., Ltd.*
3. J. D. KEPPI (deceased).
5. H. M. LANCASTER, B.A.Sc.,  
*Chief Chemist, Provincial Board of Health Laboratory.* Toronto, Ont.
1. J. L. LANG, B.A.Sc., D. & O.L.S.,  
*Lang & Ross.* Sault Ste Marie, Ont.
3. A. P. LINTON, B.A.Sc.,  
*Asst. Chief Engineer, Dept. of Highways, Prov. of Saskatchewan.* Regina, Sask.
- 4.\*A. WELLESLEY MCCONNELL, B.A.Sc.,  
*Associate Professor of Architecture, University of Toronto.* Toronto, Ont.
- 3.\*D. G. McILWRAITH,  
*Barber Green Co.* Amora, Ill.
2. J. A. MCKENZIE,  
*c/o J. A. McKenzie & Co.* Vernon, B.C.
- 1.\*J. V. McNAB,  
*Resident Engineer, C.P.R.* Moose Jaw, Sask.
3. J. A. MCPHERSON,  
1519 University Ave, Edmonton, Alta.
2. K. A. MACKENZIE, B.A.Sc. (deceased).
1. W. C. MACKINNON,  
*Dominion Bridge Co.* Lachine, P.Q.
- 3.\*W. MACLACHLAN, B.A.Sc., 183 Carlton St., Toronto, Ont.  
*Electrical Employers Ass'n., and Hydro Electric Power Commission.*
- 3.\*D. W. MARRS,  
*Chief Engineer, Erie Steel Construction Co.* Erie, Pa.
3. W. A. MAXWELL,  
*Dominion Bridge Co.* Winnipeg, Man.
- 1.\*REV. J. MELLON MENZIES, B.A.Sc., D.L.S., North Honan, China  
*Missionary*
3. L. R. MILLER, B.A.Sc., Orillia, Ont.
- 1.\*B. F. MITCHELL, B.A.Sc., Calgary, Alta.
1. F. F. MONTAGUE, 280 Wellington St. Cres., Winnipeg, Man.  
*Barrister at Law.*
- 1.\*W. J. MOORE, O.L.S., Pembroke, Ont.  
*Engineer of Highways for the County of Renfrew.*
1. C. R. MURDOCK, B.A.Sc., Dundas, Ont.  
*Town Engineer.*
2. C. J. MURPHY, B.A.Sc., Nova Scotia Bank Bldg., St. Catharines,  
*Consulting Engineer.* Ont.
- 1.\*W. P. NEAR, B.A., B.A.Sc., St. Catharines, Ont.  
*City Engineer.*
2. A. R. NEELANDS, Hamiota, Man.

\*Diploma with honours.

## 1906—Continued.

3. D. G. PARK, B.A.Sc., West Allis, Milwaukee, Wisc.  
*With Allis Chalmers.*
3. G. W. PATERSON, 91 Queen St. E., Toronto, Ont.  
*Masco Co., Ltd.*
5. R. E. PETTINGILL, Port Colborne, Ont.  
*Chief Chemist, Canada Cement Co.*
- 2.\*R. C. PURSER, B.A.Sc., Ottawa, Ont.  
*Topographical Survey Branch, Dept. of the Interior.*
3. N. R. ROBERTSON, 69 James St., Hamilton, Ont.  
*Chisholm, McQuestin & Robertson.*
1. J. O. RODDICK, B.A.Sc., Toronto, Ont.  
*Russell & Roderick, Contractors.*
1. C. H. ROGERS, B.A.Sc., Peterborough, Ont.  
*Mgr., Peterborough Canoe Co.*
- 2.\*O. ROLFSON, M.A.Sc., D. & O.L.S., Toronto, Ont.  
*Demonstrator in Chemical Engineering and Applied Chemistry,  
University of Toronto.*
1. R. C. ROSS, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys Branch, Department of the Interior.*
1. K. G. ROSS, Sault Ste. Marie, Ont.  
*Lang & Ross, Engineers and Surveyors.*
- 1.\*H. T. ROUTLY, O. & D.L.S., 109 Lytton Blvd., Toronto, Ont.  
*Highway Engineer and Contractor.*
2. J. H. RYCKMAN, A.M.E.I.C., Chicago, Ill.  
*c/o Bureau of Engineering, Dept. of Public Works.*
- 3.\*W. K. SANDERS, 58 Webster St. West, Newton, Mass.
- 1.\*W. A. SCOTT, B.A.Sc., D.L.S. (deceased).  
Saskatoon, Sask.
- 1.\*W. M. STEWART, B.A.Sc.,  
*Phillips, Stewart & Lee.*  
Toronto, Ont.
2. J. E. THOMSON, B.A.Sc.,  
*Lecturer in Mineralogy, University of Toronto.*
- 3.\*C. L. VICKERY (deceased).
5. W. E. WICKETT (deceased).
- 3.\*J. N. WILSON, B.A.Sc.,  
*Asst. Eng., Hydro-Electric Power Commission.*  
Toronto, Ont.
- 3.\*E. M. WOOD, B.A.Sc.,  
*Hydro-Electric Power Commission.*  
Toronto, Ont.

## 1907.

- 3.\*F. G. ALLEN, B.A.Sc., 707 High Street, Easton, Pa.
1. F. J. ANDERSON, B.A.Sc. (Killed in action, Nov. 1917).
1. A. P. AUGUSTINE, Penticton, B.C.  
*District Engineer, Water Rights Branch.*
1. O. B. BOURNE, Morrisburg, Ont.  
*Hydro-Electric Power Commission.*
- 3.\*H. D. BOWMAN, B.A.Sc., Brooklyn, N.Y.
3. W. S. BRADY, B.A.Sc., 413 Palmerston Ave., Toronto, Ont.
1. G. H. BROUGHTON, 176 Montrose Ave., Toronto, Ont.
1. J. A. BROWN, B.A.Sc., Vancouver, B.C.  
*Trussed Concrete Steel Co.*
1. W. J. BRUCE, Sault Ste. Marie, Ont.  
*Dept. of Public Works.*

---

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 133

1907—Continued.

1. C. E. BUSH, B.A.Sc., Box 306, Shelbourne
3. J. H. CASTER, Toronto, Ont.
- Hydro-Electric Power Commission.*
- 1.\*E. CAVELL, Toronto, Ont.
5. R. M. COLEMAN, Copper Cliff, Ont.
- International Nickel Co.*
- 1.\*C. B. B. CONNELL, St. Kitts, B.W.I.
- 3.\*G. C. COWPER, B.A.Sc., Ottawa, Ont.
- Topographical Surveys in Sask.*
2. J. V. CULBERT, B.A.Sc.
3. \*R. S. DAVIS, B.A.Sc., 1150 Hamilton St., Vancouver, B.C.
- Davis, Hartney & Co.*
3. S. D. EVANS, B.A.Sc., Leamington, Ont.
- 3.\*F. R. EWART, B.A.Sc., Excelsior Life Building, Toronto, Ont.
- Ewart, Jacob & Bebam.*
1. G. R. S. FLEMING. (Killed in action, 1917).
6. P. C. FUX, B.A.Sc., Brantford, Ont.
- With Waterous Engine Works Co.*
1. J. S. GALLETLY, B.A.Sc., Brooklin, Ont.
2. G. GALT, B.A.Sc. (Killed in action, France, 1916).
1. A. B. GARROW, B.A.Sc., 126 Avenue Rd., Toronto, Ont.
1. A. GILLIES, B.A.Sc., St. Mary's, Ont.
- St. Mary's Machine Co.*
1. G. W. GRAHAM, Eugenia, Ont.
3. C. S. GRASSETT, B.A.Sc., Toronto, Ont.
- Asst. Construction Engineer, Hydro Electric Power Commission.*
- 1.\*R. E. W. HAGARTY, B.A.Sc., 1101 Temple Bldg., Toronto, Ont.
- Consulting Engineer.*
3. K. HALL, B.A.Sc., 87 Sherman Ave. S., Hamilton, Ont.
1. C. T. HAMILTON, B.A.Sc., 1028 Standard Bank Bldg., Vancouver, B.C.
- Johnston and Hamilton.*
3. R. A. HARE, St. Catharines, Ont.
- With Canadian Crocker Wheeler Co.*
1. H. F. H. HERTZBERG, Halifax, N.S.
- Colonel, Commanding Royal Canadian Engineers.*
- 3.\*H. O. HILL, B.A.Sc., 111-9th St., Aspinwall, Pa.
- 1.\*T. H. HOGG, B.A.Sc., C.E., Toronto, Ont.
- Asst. Engineer, Hydro-Electric Power Commission.*
- 3.\*C. H. HUTTON, B.A.Sc., Hamilton, Ont.
- Engineering Staff, Dominion Power Co.*
1. H. M. HYLAND, B.A.Sc., 82 St. Albans St., Toronto, Ont.
- Hyland Const. Co.*
3. E. W. HYMAN, B.A.Sc. (deceased).
- 3.\*L. G. IRELAND, B.A.Sc., 190 University Ave., Toronto, Ont.
- Dist. Mgr., Hydro-Electric Power Commission.*
- 1.\*W. JACKSON, B.A.Sc., Box 245, Niagara Falls, Ont.
- Div. Engineer, Hydro-Electric Power Commission.*
- 4.\*C. B. JACKSON, Toronto, Ont.
- Jackson-Lewis Co.*
- 3.\*E. W. KAY, B.A.Sc., Hamilton, Ont.
- Instructor, Technical School.*
3. D. F. KEITH, B.A.Sc., 297 Campbell Ave., Toronto, Ont.
- c/o Keith's Ltd.*

\*Diploma with honours.

## 1907—Continued.

1. H. P. KEITH, Edmonton, Alta.  
*Smith & Keith, Alta. Land Surveyors and Engineers.*
1. A. A. KINGHORN, B.A.Sc., Toronto, Ont.  
*Manager, Asphaltic Concrete Co. of Toronto, Ltd.*
1. L. W. KLINGER, 410 Dovercourt Rd., Toronto, Ont.  
*Asphaltic Co. of Toronto, Ltd.*
- 1.\*F. C. LAMB, B.A.Sc., Saskatoon, Sask.  
*Phillips, Stewart & Lee.*
3. A. D. LE PAN, B.A.Sc., Toronto, Ont.  
*Supt. of Buildings and Grounds, University of Toronto.*
1. J. H. LINDSAY, S. & D. L. S., Prince Albert, Sask.  
*Dist. Surveyor and Engineer, Public Works Dept.*
3. J. A. D. McCURDY, 206 Russil Hill Rd., Toronto, Ont.  
*Canadian General Electric Co., Ltd.*
- 1.\*J. B. MCFARLANE, B.A.Sc., Lake Saskatoon, Alta.  
*Dominion Land Surveyor.*
- 3.\*D. J. MCGUGAN, B.A.Sc., P.O. Box. 107, New Westminster, B.C.  
*Burnett & McGugan.*
3. A. H. MCINTOSH, 59 Albany Ave., Toronto, Ont.
3. F. W. MACNEILL, B.A.Sc., 1063 Pender St. W., Vancouver, B.C.  
*Canadian General Electric Co., Ltd.*
- 1.\*M. K. MCQUARRIE, Kentville, N.S.  
*Engineer, D.A.R.*
1. A. G. MACKAY, New York, N.Y.  
*With Hudson & Manhattan Ry. Co.*
1. W. D. MACKENZIE, 501 Tribune Bldg., Winnipeg, Man.  
*Div. Engineer, Greater Winnipeg Water Dist.*
- 1.\*G. MACLEOD, 10126 124th Street, Edmonton, Alta.
1. W. S. MALCOLMSON, B.A.Sc., 163 Havelock Street, Toronto, Ont.  
*Engineer and Surveyor.*
3. S. A. MARSHALL, Lachine, Que.  
*Dominion Bridge Co.*
6. D. H. C. MASON, B.A.Sc., 295 Russell Hill Drive, Toronto, Ont.
3. H. V. MAYNARD, Toronto, Ont.  
*Canadian General Electric Co.*
1. J. W. MELSON, B.A.Sc., Toronto, Ont.  
*Lecturer in Surveying, University of Toronto.*
1. G. G. MILLS, B.A.Sc., 136 Roxborough St. W., Toronto, Ont.
3. J. B. MINNS, B.A.Sc., Toronto, Ont.  
*Canadian General Electric Co.*
- 4.\*G. N. MOLESWORTH, 3 Hawthorne Ave., Toronto, Ont.
1. J. M. MOORE, B.A.Sc., London, Ont.  
*With McClary Mfg. Co.*
- 5.\*P. F. MORLEY, Toronto, Ont.  
*Chemist, Provincial Board of Health Laboratory.*
1. E. W. MURRAY, B.A.Sc., Regina, Sask.  
*Dept. of Public Works.*
3. J. D. MURRAY, 17 Regal Rd., Toronto, Ont.
1. E. W. NEELANDS, B.A.Sc., New Liskeard, Ont.  
*Sutcliffe & Neelands, Consulting Engineers.*
1. R. E. K. NEELANDS, B.A.Sc., Box 163, Guelph, Ont.
- 2.\*B. NEILLY, B.A.Sc., M.E., 120 Bay St., Toronto, Ont.
1. A. E. NOURSE, B.A.Sc., Toronto, Ont.  
*Hydro Electric Power Comm.*

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 135

1907—Continued.

3. J. J. O'SULLIVAN, <i>Canada Railway News Co.</i>	21 Thorburn Ave., Toronto, Ont.
2. T. K. PATON, <i>Mining Engineer.</i>	Wardner, Ida.
1. F. W. PAULIN, O.L.S., <i>Contractor.</i>	Bank of Hamilton Bldg., Hamilton, Ont.
1. R. B. POTTER, B.A.Sc., <i>Asst. Engineer, Roadways Dept., City Hall.</i>	235 Garden Ave., Toronto, Ont.
3.*F. E. PROCHNOW, B.A.Sc. <i>With Parker &amp; Prochnow, Patent Attorneys.</i>	Buffalo, N.Y.
3.*J. F. PROCUNIER,	1232 Victoria Ave., Vancouver, B.C.
3. G. E. QUANCE, B.A.Sc., <i>Quance Bros. Ltd.</i>	Delhi, Ont.
3.*H. RAINES, <i>With Prack &amp; Perrine, Architects and Engineers.</i>	Toronto, Ont.
1.*J. L. RANNIE, B.A.Sc., <i>Observer, Geodetic Survey.</i>	Ottawa, Ont.
3. C. W. B. RICHARDSON, B.A.Sc., <i>Dominion Bridge Co.</i>	Toronto, Ont.
1. A. A. RIDLER, <i>Supt. Constructing &amp; Paving Co., Ltd.</i>	Toronto, Ont.
5. H. E. ROTHWELL, B.A.Sc., <i>Chief Chemist, Harris Abattoir Co. Ltd.</i>	Toronto, Ont.
5. C. A. SCHOFIELD, <i>National Aniline &amp; Chemical Co.</i>	Buffalo, N.Y.
1.*A. C. T. SHEPPARD, <i>Geological Survey.</i>	Ottawa, Ont.
1. F. R. SMITH, B.A.,	Vancouver, B.C.
3. E. R. SMITHRIM, B.A.Sc.,	Strathroy, Ont.
1.*W. SNAITH, C.E., <i>c/o Riordon Co. Ltd.</i>	Mattawa, Ont.
3. A. C. SPENCER, B.A.Sc.,	300 Dufferin Ave., London, Ont.
3. G. S. STEWART, <i>Sales Engineer, Canadian General Electric Co.</i>	Toronto, Ont.
1. J. A. STILES, B.A.Sc., <i>Asst Chief Commissioner, Boy Scouts.</i>	Ottawa, Ont.
3.*J. L. STIVER, <i>Gas &amp; Electric Inspector.</i>	133 Sunnyside Ave., Ottawa, Ont.
1. J. L. T. STUART, B.A.Sc., <i>The Pedlar People Limited.</i>	Oshawa, Ont.
1. G. F. SUMMERS, O.L.S., <i>Engineer and Surveyor.</i>	Haileybury, Ont.
1.*H. W. SUTCLIFFE, <i>Sutcliffe &amp; Neelands, Consulting Engineers.</i>	New Liskeard, Ont.
1. P. M. THOMPSON, B.A.Sc., <i>Office of City Architect.</i>	195 Briar Hill Ave., Toronto, Ont.
3. O. R. THOMSON, B.A.Sc., <i>Hydro Elec. Power Comm.</i>	Belleville, Ont.
1. L. R. THOMSON, B.A.Sc., <i>Secretary, Lignite Utilization Board.</i>	Montreal, Que.
1. W. J. WALKER, <i>With Transcontinental Ry.</i>	Grant, Ont.
1. E. D. WILKES, B.A.Sc., <i>c/o Allen Co. General Supplies.</i>	Oakville, Ont.

\*Diploma with honours.

## 1907—Continued.

3. A. F. WILSON, B.A.Sc.,  
With Cleveland Telephone Co. Cleveland, Ohio.  
 3. M. H. WOODS, B.A.Sc., Toronto, Ont.  
 1. G. W. A. WRIGHT, 65 Oakmount Bl., Toronto, Ont.  
 3. J. YOUNG, Box 2973, Winnipeg, Man.  
Chief Inspector, Western Canada Fire Underwriters' Association.  
 3.\*A. R. ZIMMER, B.A.Sc., Toronto, Ont.  
Lecturer in Electrical Engineering, University of Toronto.

## 1908.

3. H. G. AKERS, B.A.Sc. (deceased).  
 3. L. F. ALLAN, 58 Wychwood Ave., Toronto, Ont.  
Roadways Dept.  
 1.\*C. B. ALLISON, O.L.S., South Woodslee, Ont.  
 1.\*R. M. ANDERSON, B.A.Sc., 703 Temple Bldg., Toronto, Ont.  
Surveyor.  
 5. R. J. ARENS, B.A.Sc., Akron, O.  
Supt., Firestone Tire & Rubber Co.  
 3. H. C. BARBER, B.A.Sc., Toronto, Ont.  
Standard Underground Cable Co.  
 1. E. BARTLETT, B.A.Sc., Elkwater, Alta.  
Surveyor and Civil Engineer.  
 2. F. J. BEDFORD (deceased).  
 1.\*G. G. BELL, Sewickley, Pa.  
 3. G. E. BLACK, B.A.Sc., Guelph, Ont.  
Provincial Farm.  
 3. H. F. BOWES, 143 Gillard Ave., Toronto, Ont.  
 3.\*J. H. BRACE, Montreal, P.Q.  
Traffic Engineer, Bell Telephone Co.  
 1. P. R. BRECKEN, B.A.Sc., 108 Sixth Ave. W., Calgary, Alta.  
Manager, P. R. Brecken, Ltd.  
 3. E. I. BROWN, 111 Broadway, New York, N.Y.  
Mgr., Mora & Mendoza.  
 1. W. F. M. BRYCE, Ottawa, Ont.  
Assistant Engineer, City Engineer's Department.  
 3. P. H. BUCHAN, B.A.Sc., 1946-15th Ave. W., Vancouver, B.C.  
B. C. Electric Railway Co.  
 2. J. E. CAMPBELL, B.A.Sc., Coldstream, Ont.  
 3. N. A. CAMPBELL, 629 4th Street, Edmonton, Alta.  
 3. A. M. CARROLL, Toronto, Ont.  
Can. Aladdin Co.  
 1. H. R. CARSCALLEN, B.A.Sc., Ottawa, Ont.  
Reclamation Service, Dept. of Interior.  
 3. G. CHALLEN,  
 1. F. H. CHESNUT, B.A.Sc., Chedoke P.O., Hamilton, Ont.  
With White Truck Co.  
 1. W. E. COLE (deceased).  
 4.\*W. C. COLLETT, B.A.Sc., San Francisco, Cal.  
Architect.  
 1. R. Y. CORY, B.A.Sc., Apt. 14, 6 Howard St., Toronto, Ont.  
 3.\*H. COYNE, B.A.Sc., 95 Metcalfe St., St. Thomas, Ont.  
 2.\*J. D. CUMMING, B.A.Sc., 61 E. Jefferson Ave., Detroit, Mich.  
Mgr., Detroit Spring Co.

---

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 137

1908—Continued.

6. A. D. DAHL, B.A.Sc.,  
*Chemist, Dow Chemical Co.* Midland, Mich.  
1. F. A. DANKS,  
*Secretary-Treasurer, Automatic Telephones Co.* 280 Wright Ave., Toronto, Ont.  
3. J. DARROCH,  
*Draftsman, Autoparts Mfg. Co.* Detroit, Mich.  
3. H. C. DOORLY (deceased).  
2. R. H. DOUGLAS,  
*Inspector, Government Telephone.* Edmonton, Alta.  
2.\*F. C. DYER, B.A.Sc.,  
*Asst. Professor of Mining Engineering, University of Toronto.* Toronto, Ont.  
1. F. M. EAGLESON,  
*Engineer and Surveyor.* Winchester, Ont.  
1. C. EDWARDS, B.A.Sc.,  
*Sewer Section, City Hall.* 158 Dowling Ave., Toronto, Ont.  
1. S. L. EVANS, B.A.Sc.,  
1. E. O. EWING, B.A.Sc.  
*With Harkness, Loudon & Herzberg.* Toronto, Ont.  
1. O. L. FLANAGAN, B.A.Sc.,  
*Can. Mining Corp.* Le Pas, Man.  
1. C. FLINT, B.A.Sc.,  
1. A. H. FOSTER, B.A.Sc.,  
*Manager, Brantford Municipal Ry. Comm.* 946 McMillan Ave., Brantford, Ont.  
‘Winnipeg, Man.  
3. G. C. FRANCIS,  
*With Canadian Fire Underwriters Ass'n.* Toronto, Ont.  
3. S. S. GEAR,  
1. C. A. GRASSIE, B.A.Sc.,  
*With Kennedy & Sons.* Ft. Erie, Ont.  
Collingwood, Ont.  
3.\*C. L. GULLEY, B.A.Sc.,  
*Gen. Manager, Superior Electrics, Ltd.* Renfrew, Ont.  
3. J. W. HACKNER, B.A.Sc.,  
*Asst. Engineer, Dept. of Public Works.* Toronto, Ont.  
3. F. L. HAVILAND,  
*Draftsman, Hamilton Bridge Works Co.* Hamilton, Ont.  
1.\*C. D. HENDERSON,  
*Canadian Bridge Co.* Walkerville, Ont.  
1. E. G. HEWSON,  
*Division Engineer, Grand Trunk Ry.* 603 Union Station, Toronto, Ont.  
5.\*D. J. HUEETHER, B.A.Sc.,  
*With Dunlop Tire and Rubber Co.* Toronto, Ont.  
1. A. D. HUEETHER, B.A.Sc.,  
*Ontario Hydro Comm.* Niagara Falls, Ont.  
3.\*A. N. HUNTER, B.A.Sc.,  
*With Hydro-Electric Power Commission.* 71 Sherwood Ave., Toronto, Ont.  
3. S. B. ILER,  
*Asst. Eng., Hydro-Electric Power Commission.* 190 University Ave., Toronto, Ont.  
1.\*J. T. JOHNSTON, B.A.Sc.,  
*Asst. Director, Water Power Branch, Dept. of the Interior.* Ottawa, Ont.  
2. H. G. KENNEDY, B.A.Sc.,  
*O'Brien Mine.* Cobalt, Ont.  
1.\*W. R. KEYS,  
3. W. C. KILLIP,  
*With W. J. Westaway & Co.* Winchester, Ont.  
Hamilton, Ont.

\*Diploma with honours.

## 1908—Continued.

- 3.\*J. N. M. LESLIE, B.A.Sc., 1207 Bank of Hamilton Bldg., Toronto,  
*With Canadian Westinghouse Co.* [Ont.]
3. F. C. LEWIS,  
*F. C. Lewis Sales Co.* Indianapolis, Ind.
3. H. R. LYNAR,  
*Welland Ship Canal Office.* St. Catharines, Ont.
- 1.\*W. G. McGEOERGE,  
*Consulting Engineer.* 129 William St. S., Chatham, Ont.
1. J. M. MCGREGOR, Glencoe, Ont.
1. L. A. MCLEAN, B.A.Sc. (deceased).
1. W. A. A. McMMASTER, A.S. & D.L.S., Prince Albert, Sask.
1. H. C. MCMORDIE, B.A.Sc., Walkerville, Ont.  
*Chief Engineer, Trussed Concrete Steel Co.*
- 1.\*A. A. MCROBERTS, B.A.Sc., North Bay, Ont.  
*T. & N. O. Ry.*
- 5.\*N. G. MADGE, 24 Doane Ave., Providence, R.I.  
*Chief Chemist, Revue Rubber Co.*
3. J. E. MALONE, B.A.Sc., Chicago, Ill.  
*With Illinois Steel Co.*
5. K. D. MARLATT, Oakville, Ont.  
*Marlatt & Armstrong Tanning Co.*
1. R. J. MARSHALL, B.A.Sc., 100 Jarvis St., Toronto, Ont.  
*Canadian Inspection & Testing Laboratories, Ltd.*
5. G. L. MILLIGAN, B.A.Sc., 128 St. George St., Toronto, Ont.
1. A. B. MITCHELL, 76 Spencer Ave., Toronto, Ont.
- 4.\*J. C. P. MOLESWORTH (deceased).
3. E. D. MONK, B.A.Sc., Cincinnati, Ohio  
*General Electric Co.*
- 3.\*F. H. MOODY, B.A.Sc., Oshawa, Ont.  
*McLaughlin Motor Car Co.*
3. J. H. MORICE, B.A.Sc., 120 Woodland Ave., Schenectady, N.Y.  
*With General Electric Co.*
- 3.. F. E. H. MOWBRAY, B.A.Sc., 812 King St. E., Hamilton, Ont.  
*Canadian Westinghouse Co.*
- 3.\*W. P. MURRAY, B.A.Sc., Lachine, P.Q.  
*Erection Dept., Dominion Bridge Co.*
5. M. E. NASMITH, Terre Haute, Ind.  
*Commercial Solvents Limited*
3. W. de C. O'GRADY, Toronto, Ont.  
*With Steel & Radiation.*
1. H. J. PECKOVER, B.A.Sc., 16 Maynard Ave., Toronto, Ont.  
*Peckover's Ltd.*
- 1.\*M. PEQUEGNAT, B.A.Sc., Kitchener, Ont.  
*Superintendent of Water Works.*
1. H. G. PHILLIPS, D. & S.L.S., Regina, Sask.  
*Smith & Phillips, Civil Engineers.*
3. M. PIVNICK, B.A.Sc., D.D.S., 380 Queen St. W., Toronto, Ont.  
*Dentist.*
- 1.\*E. M. PROCTOR, B.A.Sc., 36 Toronto St., Toronto, Ont.  
*Manager E. A. James & Co., Ltd.*
- 3.\*C. F. PUBLOW, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. J. T. RANSOM, B.A.Sc., D. & O.L.S., 171 Arlington Ave., Toronto,  
*Demonstrator in Physics, University of Toronto.* Ont.
- 1.\*W. B. REDFERN, B.A.Sc., 36 Toronto St., Toronto, Ont.  
*Sec.-Treas., E. A. James & Co., Ltd.*

## 1908—Continued.

1. F. L. RICHARDSON, B.A.Sc. 74 Duke St., St. John, N.B.  
*Public Works Dept.*
3. H. A. RICKER, B.A.Sc. 93 Sanford Ave. S., Hamilton, Ont.  
*Designer, Canadian Westinghouse Co.*
1. A. R. ROBERTSON, B.A.Sc., 1139 Shaw St., Toronto, Ont.  
*Sales Eng., McGregor & McIntyre, Ltd.*
5. F. A. ROBERTSON, 190 University Ave., Toronto, Ont.  
*Asst. Eng., Hydro-Electric Power Commission.*
- 1.\*W. A. ROBINSON, Winnipeg, Man.  
*Right-of-Way Surveyor, C.P.R.*
3. R. C. ROBINSON, Winnipeg, Man.  
*With C. N. Ry.*
5. L. J. ROGERS, B.A.Sc., Toronto, Ont.  
*Assistant Professor in Analytical Chemistry, University of Toronto.*
- 2.\*R. R. ROSE, B.A.Sc., Drummond Bldg., Montreal, Que.  
*Asst. Secy., Canadian Mining Institute.*
3. D. ROSS, B.A.Sc., 9 Hawkin Ave., Toronto, Ont.
1. A. O. SECORD, 10 Queen St., Brantford, Ont.  
*President, Arthur O. Secord Co.*
3. W. E. V. SHAW, B.A.Sc., 750 Summit Ave., Milwaukee, Wis.
3. H. F. SHEARER, B.A.Sc., Smith's Falls, Ont.  
*Manager, Hydro-Electric Power Commission.*
1. W. L. STAMFORD, B.A.Sc., Prince Rupert, B.C.  
*Marine & Fisheries Dept.*
3. R. H. STARR, B.A.Sc., Orillia, Ont.  
*Engineer, Orillia Water, Light & Power Commission.*
3. A. W. J. STEWART, Toronto, Ont.  
*Toronto Hydro-Electric System.*
3. J. ST. LAWRENCE, Erie, Pa.  
*General Electric Co.*
1. J. J. STOCK, D.L.S., 448 Cooper St., Ottawa, Ont.  
*Topographical Surveys, Dept. of the Interior.*
1. H. B. STUART, B.A.Sc., 66 Wyycliffe Ave., Hamilton, Ont.  
*Hamilton Bridge Works.*
2. J. L. G. STUART, B.A.Sc., Oshawa, Ont.  
*The Pedlar People Limited.*
3. A. D. SWORD, B.A.Sc., Hamilton, Ont.  
*Designing Engineer, W. J. Westaway Co.*
3. J. W. R. TAYLOR, B.A.Sc., Toronto, Ont.  
*Sales Eng., Canadian Westinghouse Co.*
- 1.\*W. E. TAYLOR, B.A.Sc., 22 Falcon St., Toronto, Ont.  
*Contractor.*
3. V. C. THOMAS, B.A.Sc., 34 McRae St., Niagara Falls, Ont.  
*Contractor.*
1. J. H. THORNLEY, B.A.Sc., Niagara Falls, Ont.
1. C. G. TOMS, B.A.Sc., 56 Spencer Ave., Toronto, Ont.  
*General Manager, Toms Contracting Co., Ltd.*
1. H. W. TYE, Balcarres, Sask.
3. C. P. VAN NORMAN, B.A.Sc., 39 Roxborough St. E., Toronto, Ont.  
*c/o R. W. Mann.*
1. T. L. VILLENEUVE, Chicoutimi, Que.  
*Assistant Engineer, Dept. of Public Works.*
1. J. A. WALKER, B.A.Sc., A.M.E.I.C., B.C.L.S., 103 London Bldg., Vancouver, B.C.  
*The Jamieson Engineering Co.*

\*Diploma with honours.

## 1908—Continued.

- 3.\*B. W. WAUGH, B.A.Sc., Kitchener, Ont.  
 3. R. M. WEDLAKE, B.A.Sc., Brantford, Ont.  
*With Cockshutt Plow Co., Ltd.*  
 3. R. P. WEIR, 923 Bank of Hamilton Bldg., Toronto, Ont.  
*Eng. Dept., Cutter Elec. and Mfg. Co.*  
 1. A. M. WEST, B.A.Sc., City Hall, N. Vancouver, B.C.  
 1. W. R. WHITE, Ottawa, Ont.  
*Chief Surveyor's Office, Dept. of Indian Affairs.*  
 3. W. J. WHITE, B.A.Sc., Perth, Australia.  
*With British Thomson Houston Co.*  
 3.\*F. D. WILSON, B.A.Sc., Detroit, Mich.  
*The Austin Co., Engineers and Builders.*  
 1. J. M. WILSON, Toronto, Ont.  
*District Engineer, Dept. of Public Works of Canada.*  
 1. D. O. WING, St. John's, Que.  
*c/o Anglin, Norcross, Ltd.*  
 3.\*R. YOUNG, Vancouver, B.C.  
*With B.C. Electric Railway Co.*

## 1909.

3. E. G. ARENS, Orillia, Ont.  
*E. Long Mfg. Co.*  
 3. H. V. ARMSTRONG, Estevan, Sask.  
*Town Engineer.*  
 2.\*E. T. AUSTIN, B.A.Sc., Coniston, Ont.  
*With the Mond Nickel Co.*  
 3. W. H. BARRY, B.A.Sc., Hamilton, Ont.  
*Firestone Fire & Rubber Co.*  
 3. R. D. S. BECKSTEDT, B.A.Sc., Lacolle, Que.  
 3. R. E. BEITH, 174 Howland Ave., Toronto, Ont.  
 1.\*G. A. BENNETT, B.A.Sc., C.E., Ottawa, Ont.  
*Topographical Surveys Br., Dept. of the Interior.*  
 3. E. R. BIRCHARD, B.A.Sc., 420 Yonge St., Toronto, Ont.  
*Republic Motor Car Co.*  
 3. A. M. BITZER, Ottawa, Ont.  
*Interpreter, Dept. Secretary of State.*  
 3. W. D. BLACK, B.A.Sc., Toronto, Ont.  
*Supt., Otis-Fensom Elevator Co., Ltd.*  
 3.\*D. C. BLIZARD, B.A.Sc., Tampico, Mexico.  
*El Aquila Refinery.*  
 1.\*W. J. BOULTON, B.A.Sc., Ottawa, Ont.  
*Surveyor, Dept. of Interior.*  
 3. G. H. BOWEN, B.A.Sc., Wallaceburg, Ont.  
*Chief Engineer, Dominion Glass Co.*  
 3. C. E. BROWN, B.A.Sc., Chatham, Ont.  
*Asst. Mgr. Service Dept., Gray Dort Motors Ltd.*  
 1. E. W. BROWNE, B.A.Sc., 247 Cannon St. E., Hamilton, Ont.  
 1. J. A. BUCHANAN, 10234 122nd St., Edmonton, Alta.  
*With Permanent Construction Co.*  
 3. J. E. BURNS, B.A.Sc., 231 Seaton St., Toronto, Ont.  
 1. M. G. CAMERON, B.A.Sc., 441 Reid St., Peterboro', Ont.  
 3.\*R. A. CAMPBELL, Sault Ste. Marie, Ont.  
*With the Great Lakes Power Co., Ltd.*

\*Diploma with honours.

## 1909—Continued.

1. V. S. CHESNUT, B.A.Sc., <i>With St. John Dry Dock Co.</i>	East St. John, N.B.
1.*C. G. CLINE, B.A.Sc., <i>Division Engineer, B.C. Hydrometric Survey.</i>	Kamloops, B.C.
1. J. G. COLLINSON, B.A.Sc., <i>Welland Ship Canal.</i>	Port Weller, Ont.
1. G. W. COLTHAM, B.A.Sc., <i>With Frank Barber.</i>	Toronto, Ont.
3.*H. A. COOCH, B.A.Sc., <i>Sales Eng., Canadian Westinghouse Co.</i>	Bank of Hamilton Bldg., Toronto, Ont.
3. W. E. CORMAN, <i>Corman Eng. Co.</i>	58 Stewart St., Toronto, Ont.
3. T. H. CROSBY, B.A.Sc., <i>Sales Engineer, Canadian Westinghouse Co.</i>	Vancouver, B.C.
3. R. H. CUNNINGHAM, <i>Hiram Walker &amp; Sons Metal Products Ltd.</i>	Walkerville, Ont.
1.*F. A. DALLYN, B.A.Sc., C.E., <i>Sanitary Engineer, Provincial Board of Health Laboratory.</i>	Toronto, Ont.
3. C. N. DANKS, <i>Asst. Engineer, Canadian Ingersoll Rand Co., Ltd.</i>	Sherbrooke, Que.
1. E. M. DANN. (Died of wounds received in action, France, 1916).	
3. H. W. DAVIS, <i>With A. Davis &amp; Son, Ltd., Leather Manufacturers.</i>	Kingston, Ont.
2.*A. I. DAVIS, B.A.Sc., <i>Military Works Department.</i>	G.P.O., Mesopotamia
1. H. C. DAVIS,	Burlington, Ont.
1. I. H. DAWSON. (Died of wounds received in action, 1918).	
3. W. H. DELAHAYE, B.A.Sc., <i>Patents Office, Dept. Trade and Com.</i>	Ottawa, Ont.
3. W. P. DERHAM, B.A.Sc., <i>M. J. O'Brien, Ltd.</i>	Renfrew, Ont.
5.*W. A. DODDS, B.A.Sc. <i>Chief Chemist, Penman-Littlehales Chemical Co.</i>	Syracuse, N.Y.
1. R. H. DOUGLAS, <i>Department of Public Works.</i>	Edmonton, Alta.
6. A. R. DUFF, <i>Research Asst., University of Toronto.</i>	211 Fern Ave., Toronto, Ont.
1. M. O. DUFF (deceased).	
2. L. J. DUTHIE,	33 High Park Gardens, Toronto, Ont.
1. F. S. FALCONER, B.A.Sc., <i>Geological Surveys Br., Dept. of Interior.</i>	Ottawa, Ont.
3. T. A. FARGEY, B.A.Sc.,	70 Eaton Place, East Orange N.J.
1. J. B. FERGUSON, B.A.Sc., <i>c/o Div. Engineer, V.P.R.R.</i>	Cheyenne, Wyoming.
3. A. T. FERGUSSON, B.A.Sc.,	70 Madison Ave., Toronto, Ont.
3. T. E. FREEMAN, B.A.Sc., <i>Manager, Canada Steel Goods Co., Ltd.</i>	Hamilton, Ont.
3. E. R. FROST, B.A.Sc., <i>With Dominion Tire Co.</i>	Kitchener, Ont.
1. A. E. GLOVER, B.A.Sc., <i>Permanent Construction Co.</i>	Edmonton, Alta.
5. A. E. GOODERHAM, <i>With Gooderham &amp; Worts.</i>	Toronto, Ont.

\*Diploma with honours.

## 1909—Continued.

1. D. A. GRAHAM, B.A.Sc.,  
*Canadian National Ry.* Vernon, B.C.
2. R. R. GRANT,  
*Contractor,* 961½ Gerrard St. E., Toronto, Ont.
1. J. E. GRAY, B.A.Sc.,  
*c/o Morphy & Underwood.* Saskatoon, Sask.
1. G. E. D. GREENE, B.A.Sc., 139 Cottingham St., Toronto, Ont.
1. W. H. GREENE,  
*Assistant City Engineer.* Moose Jaw, Sask.
1. W. W. GUNN, B.A.Sc., 20 Glenwood Ave., Toronto, Ont.
3. F. G. HAGEMAN, 1780 Urbana Rd., Cleveland, Ohio.
3. C. J. HARPER  
*Engineer and Surveyor.* Collingwood, Ont.
1. D. W. HARVEY, B.A.Sc., 52 Balmoral Ave., Toronto, Ont.
- I. C. O. HAY (deceased).
- 3.\*J. HEMPHILL,  
*Construction Engineer, Algoma Steel Corp., Mines Dept.* Magpie Mine, Ont.
- 1.\*G. HOGARTH,  
*Chief Engineer of Highways, Dept. of Public Works of Ontario.* Toronto, Ont.
3. A. E. HOLMES, B.A.Sc.,  
*Knight Metal Products.* Toronto, Ont.
3. C. R. HOLMES, B.A.Sc., Chatham, Ont.
1. G. C. HOSHAL, B.A.Sc.,  
*Wells & Gray.* Toronto, Ont.
3. C. HUGHES, B.A.Sc. (killed in action, France, 1915).
1. A. E. HUNTER, B.A.Sc. (deceased).
3. H. IRWIN, B.A.Sc., 2 Triller Ave., Toronto, Ont.
3. J. ISBISTER, B.A.Sc.,  
*Onaway Electric Light and Power Co.* Onaway, Mich.
3. F. P. JACKES, B.A.Sc. (killed in action, France, 1918).
- 1.\*J. E. JACKSON, 164 Cumberland Ave., Hamilton, Ont.
1. E. W. JAMES, B.A.Sc.,  
*Bridge Engineer, Manitoba Government.* Winnipeg, Man.
- 1.\*C. C. JOHNSON, B.A.Sc., 143 Springhurst Ave., Toronto, Ont.
1. C. E. JOHNSTON, B.A.Sc. (deceased).
1. W. J. JOHNSTON, 1816 Waterloo Rd., Vancouver, B.C.
- 1.\*A. H. E. KEFFER, B.A.,  
*Assistant Engineer, E. A. James & Co.* 626 Brock Ave., Toronto, Ont.
3. J. B. O. KEMP, B.A.Sc., St. Catharines, Ont.  
*On Staff, Ridley College.*
3. W. R. KEY, B.A.Sc., 18 Cedar Ave., Hamilton, Ont.  
*Otis Fenson Elevator Co.*
5. H. N. KLOTZ, B.A.Sc. (Killed in action, France, 1915).
3. A. W. LAMONT, B.A.Sc.,  
*Canadian Westinghouse Co.* Winnipeg, Man.
- 3.\*C. B. LANGMUIR, B.A.Sc.,  
*Manager, Electrical Dept., Factory Products, Ltd.* Toronto, Ont.
3. A. E. LENNOX, B.A.Sc.,  
*National Lamp Works of General Electric Co.* Cleveland, Ohio
- 1.\*R. W. E. LOUCKS,  
*Provincial Surveys Branch.* Regina, Sask.
1. N. C. A. LLOYD,  
*Brown & Brown, Surveyors.* 576 Jones Ave., Toronto, Ont.

\*Diploma with honours.

## 1909—Continued.

3. E. D. MACFARLANE, B.A.Sc.,	1616 Fernwood Ave., Victoria, B.C.
1. J. G. MACKINNON,	
1. W. A. MACLACHLAN, B.A.Sc., <i>c/o T. Eaton Co.</i>	Moncton, N.B.
3. B. A. MACLEAN, B.A.Sc.,	Orillia, Ont.
1. N. W. MACPHERSON, B.A.Sc., <i>Dept. of Public Works.</i>	Edmonton, Alta.
3. D. D. McALPINE, B.A.Sc., <i>Canadian General Electric Co.</i>	212 King St. W., Toronto, Ont.
1. A. S. MCARTHUR, B.A.Sc.,	Keswick, Ont.
3. C. R. MCCOLLUM, B.A.Sc.,	Wainfleet, Ont.
3.*A. S. McCORDICK, B.A.Sc., <i>Canadian General Electric Co.</i>	Winnipeg, Man.
3. P. J. McCUAIG, B.A.Sc.,	Gamebridge, Ont.
3. W. G. MCINTOSH, B.A.Sc., <i>Toronto Transportation Commission.</i>	Toronto, Ont.
1. F. H. MCKECHNIE, B.A.Sc.,	401 Marlowe Ave., Montreal, Que.
3. J. H. MCKNIGHT,	Simcoe, Ont.
3. G. MCLEOD, <i>Electrician, Electric Light &amp; Ry. Co.</i>	Waupaca, Wis.
1. V. McMILLAN, B.A.Sc., <i>Toronto Iron Works.</i>	Toronto, Ont.
3.*A. L. MALCOLM, B.A.Sc., <i>Resident Engineer, Hydro-Electric Power Commission.</i>	Campbellford, Ont.
3. N. H. MANNING, B.A.Sc., <i>With Rolls-Royce of America, Inc.</i>	Springfield, Ill.
1.*A. B. MANSON, B.A.Sc., A.M.E.I.C., <i>City Engineer.</i>	Stratford, Ont.
1. E. S. MARTINDALE, B.A.Sc., <i>Dominion Land Surveyor.</i>	Aylmer, Ont.
1. O. W. MARTYN, B.A.Sc., D. & S.L.S., <i>Martin &amp; Macdonald, Civil Engineers.</i>	Box 54, Swift Current, Sask.
2. C. A. MORRIS, B.A.Sc., <i>Northumberland Paper and Electric Co.</i>	Campbellford, Ont.
3. G. MORTON, B.A.Sc., <i>Electrical Engineers, Ltd.</i>	Calgary, Alta.
1.*F. V. MUNRO, B.A.Sc.,	Chatham, Ont.
1. E. A. NEVILLE, B.A.Sc.,	Prince George, B.C.
1. J. NEWTON, B.A.Sc., <i>Sarnia Woollen Mills.</i>	361 London Road, Sarnia, Ont.
3.*L. S. ODELL,	151 Wallace Ave., Toronto, Ont.
3. V. J. O'DONNELL, B.A.Sc., <i>Montreal Manager, Packard Electric Co.</i>	R. 725, Power Bldg., Montreal, Que.
3. J. J. O'HEARN,	249 Queen W., Toronto, Ont.
1. A. W. PAE, <i>c/o Canada Loco Lamp Co.</i>	152 Bleury St., Montreal, Que.
1.*A. M. PETRY, B.A.Sc., <i>With Chas. Potter.</i>	61 Isabella St., Toronto, Ont.
3.*W. M. PHILP, B.A.Sc., <i>Hydro Electric Power Commission.</i>	Niagara Falls, Ont.
1. R. B. PIGOTT, B.A.Sc., <i>Piggott-Healy Construction Co.</i>	36 James St. S., Hamilton, Ont.

\*Diploma with honours.

## 1909—Continued.

2. G. M. PONTON, Montreal, Que.  
*Consulting Mining Engineer and Metallurgist.*
- 3.\*C. J. PORTER, B.A.Sc., 54 Fairhold Rd. S., Hamilton, Ont.
3. A. I. PROCTOR, 852 King St. E., Hamilton, Ont.
1. J. QUAIL, Winnipeg, Man.  
*Canadian Bridge Co.*
1. A. F. RAMSPERGER, 22 Callendar St., Toronto, Ont.
- 1.\*C. R. REDFERN, B.A.Sc., Winnipeg, Man.  
*Engineer, P. Lyall & Sons, Ltd., Contractors.*
- 3.\*L. T. RUTLEDGE, B.A.Sc., Kingston, Ont.  
*Assoc. Professor of Mechanical Engineering, Queen's University.*
1. A. U. SANDERSON, B.A.Sc., Toronto, Ont.  
*Chief Engineer, Filtration Plant.*
3. 3.\*R. A. SARA, B.A.Sc., E.E. 240 Hampton Ave., Notre Dame de Grace, Montreal, Que.
- 3.\*C. SCHWENGER, B.A.Sc., 226 Yonge St., Toronto, Ont.  
*Distril'ution Eng., Toronto Hydro-Electric System.*
1. C. A. SCOTT, 42½ Harvard Ave., Toronto, Ont.  
*Roadways Dept., City Hall.*
1. A. SEDGWICK, Toronto, Ont.  
*Ontario Dept. of Public Works.*
1. B. H. SEGRE, B.A.Sc., Le Pas, Man.  
*c/o E. P. Bowman.*
1. F. V. SEIBERT, B.A.Sc., 10741 126th St., Edmonton, Alta.  
*Engineer and Surveyor, Dept. of Interior.*
5. M. R. SHAW, B.A.Sc., Waggaman, La.  
*Chief Chemist, Export Oil Corporation.*
3. M. W. SPARLING, B.A.Sc., Cobourg, Ont.  
*Sparling & Reesom Ltd.*
3. J. J. SPENCE, Fenelon Falls, Ont.  
*Wood Turning Products Ltd.*
1. D. S. STAYNER, B.A.Sc., C.E., 201 Heath St. W., Toronto, Ont.  
*Asst. Engineer, E. A. James Co., Ltd.*
- 2.\*R. B. STEWART, M.A., B.A.Sc., Toronto, Ont.
- 1.\*N. C. STEWART, B.A.Sc., Central Park, B.C.
- 1.\*P. H. STOCK, Toronto, Ont.
1. J. C. STREET, B.A.Sc., St. Catharines, Ont.  
*Welland Ship Canal.*
3. S. STROUD, B.A.Sc., Hamilton, Ont.  
*Canadian Westinghouse Co. Limited.*
1. C. C. SUTHERLAND, B.A.Sc., C.E., 10714 125th St., Edmonton, Alta.  
*Alberta Dept. of Public Works.*
1. R. G. SWAN, B.A.Sc., 213 Hastings St. E., Vancouver, B.C.  
*Chief of Hydrographic Survey for B.C.*
- 1.\*H. W. TATE, Toronto, Ont.  
*Field Engineer, Toronto Transportation Commission.*  
*c/o C. E. Goad Co.*
- 3.\*E. A. THOMPSON, Welland, Ont.  
*Standard Steel Construction Co.*
1. G. A. TIPPER, B.A.Sc., Brantford, Ont.  
*Contracting Surveyor.*
3. A. G. TREES, B.A.Sc., 42 Wellington St. E., Toronto, Ont.  
*S. Trees & Co., Ltd.*

\*Diploma with honours.

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 145

1909—Continued

- 3. W. G. TURNBULL, B.A.Sc., 126 John St., Toronto, Ont.  
*Chief Engineer, Turnbull Elevator Mfg. Co.*
- 1. J. E. UNDERWOOD, C.E., Saskatoon, Sask.  
*Dept. of Civil Engineering, University of Saskatchewan.*
- 1. J. VAN NOSTRAND, 91 Delaware Ave., Toronto, Ont.
- 1. A. VATCHER, B.A.Sc., Freshwater, Bay de Verde, Nfld.  
*With the Reid Newfoundland Co.*
- 1. C. M. WALKER, B.A.Sc., Banff, Alta.  
*Dom. Land Surveyor.*
- 1. C. E. WEBB, B.A.Sc., 213 Hastings St. E., Vancouver, B.C.  
*B.C. Hydrographic Survey, Dom. Water Power Br.*
- 1. E. E. WEBB, Box 358, Orillia, Ont.  
*Contractor.*
- 3. F. C. WHITE, B.A.Sc. 164 Richmond Street, Chatham, Ont.  
*Engineer, Canadian Des Moines Steel Co., Ltd.*
- 3. A. R. WHITELAW, B.A.Sc., 10720 103rd St., Edmonton, Alta.
- 1. R. G. WILKINSON, Toronto, Ont.  
*Roadways Dept., City Hall.*
- 5.\*J. A. MCK. WILLIAMS, B.A.Sc., Toronto, Ont.  
*A. E. Ames & Co.*
- 1. O. T. G. WILLIAMSON, B.A.Sc., 225 Grange Road, Guelph, Ont.
- 3. L. R. WILSON, B.A.Sc., Montreal, Que.  
*Dominion Bridge Co.*
- 3. F. F. WILSON, B.A.Sc., Toronto, Ont.  
*Surveyor.*
- 2. S. A. WOKEY, B.A.Sc., Schumacher, Ont.  
*Safety Engineer, McIntyre Mine.*

1910.

- 2.\*J. H. ADAMS, B.A.Sc., 25 Maynard Ave., Toronto, Ont.
- 3. O. F. ADAMS, B.A.Sc., 132 Ulster Street, Toronto, Ont.
- 3. J. N. AGNEW, 56 Victoria Ave. S., Hamilton, Ont.
- 1.\*W. G. AMSDEN, B.A.Sc., (killed in action, Aug. 1918).
- 1. J. A. BAIRD, B.A.Sc., Sarnia, Ont.  
*Town Engineer.*
- 1.\*W. J. BAIRD, B.A.Sc., 730 Danforth Ave., Toronto, Ont.  
*W. J. Baird & Co.*
- 1. H. A. BARNETT, B.A.Sc.,
- 1.\*E. W. BERRY, Seaforth, Ont.
- 1. H. C. BINGHAM, D.L.S., Moose Jaw, Sask.  
*Engineer and Surveyor.*
- 2. D. G. BISSET, B.A.Sc., Hosmer, B.C.  
*C.P.R. Coal Mines.*
- 1.\*R. H. H. BLACKWELL, B.A.Sc., 64 St. George St., Toronto, Ont.  
*Contractor.*
- 1.\*E. P. BOWMAN, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys, Dept. of Interior.*
- 2. A. F. BROCK, B.A.Sc., Copper Cliff, Ont.  
*Chief Mine Engineer, International Nickel Co.*
- 3. M. O. BROWNE, 313 McClellan Ave., Detroit, Mich.
- 3. J. R. BURGESS, B.A.Sc., Toronto, Ont.  
*Staunton's, Ltd.*
- 1. N. G. H. BURNHAM, B.A.Sc. (deceased).

\*Diploma with honours.

## 1910—Continued.

- 3.\*W. C. CALE, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*Laboratory Eng., Hydro-Electric Power Commission.*
- 2.\*A. D. CAMPBELL, B.A.Sc., M.E., Cobalt, Ont.  
*Mining Engineer, O'Brien Mine.*
3. W. M. CARLYLE, B.A.Sc. (killed in action, 1916).
3. N. S. CAUDWELL, 6 King West, Toronto, Ont.  
*Barrister-at-Law.*
3. A. W. CHESNUT, B.A.Sc., (Died at Shorncliffe, England, while on Overseas Service).
1. D. C. CHISHOLM, B.A.Sc., Winnipeg, Man.
1. H. S. CLARK, 12 Chesnut St., St. Catharines, Ont.  
*Welland Ship Canal.*
1. J. A. CLAVEAU, Chicoutimi, Que.  
*Town Engineer.*
3. L. S. COCKBURN, B.A.Sc., Detroit, Mich.  
*Fisher Body Corporation.*
3. A. G. CODE, B.A.Sc., Brockville, Ont.  
*Code & Tete.*
3. C. R. COLE, B.A.Sc., St. Mary's, Ont.
1. G. A. COLQUHOUN, B.A.Sc., Ottawa, Ont.  
*Department of the Interior.*
- 4.\*J. H. CRAIG, B.A.Sc., 707 Yonge St., Toronto, Ont.  
*Craig & Madill, Architects.*
- 3.\*C. D. DEAN, B.A.Sc., 31 Hewitt Ave., Toronto, Ont.  
*With Imperial Oil Co.*
5. A. V. DELAPORTE, B.A.Sc., 81 Wilson Ave., Toronto, Ont.  
*Chemist, Provincial Board of Health Laboratory.*
3. R. L. DOBBIN, B.A.Sc., 622 George St., Peterboro', Ont.  
*Superintendent, Peterboro' Utilities Commission.*
- 3.\*W. P. DOBSON, M.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*Laboratory Eng., Hydro-Electric Power Commission.*
- 3.\*J. M. DUNCAN, B.A.Sc., 26 Manning Arcade, Toronto, Ont.  
*c/o Lewis Duncan.*
1. L. F. EADIE, 36 Laughton Ave., Toronto, Ont.
2. V. H. EMERY, B.A.Sc., Timmins, Ont.  
*Mine Supt., Hollinger Mines.*
3. W. J. EVANS, B.A.Sc., Toronto, Ont.  
*With Hydro-Electric Power Comm.*
3. H. W. FAIRLIE, St. Lamberts, Que.  
*Sales Manager, Monarch Electric Co.*
- 3.\*C. R. FERGUSON, B.A.Sc., Toronto, Ont.  
*Dominion Bridge Co.*
3. J. W. FERGUSON, B.A.Sc., Toronto, Ont.  
*Canadian Allis Chalmers, Ltd.*
- 4.\*J. B. K. FISKEN, B.A.Sc., Toronto, Ont.  
*With Darling & Pearson.*
1. A. W. FLETCHER, B.A.Sc., Thornton, Ont.
- 1.\*J. A. FLETCHER, Courtney, B.C.
3. F. T. FLETCHER, B.A.Sc., Calgary, Alta.  
*Dept. of Public Works.*
3. T. R. C. FLINT, B.A.Sc., 12 Galley Ave., Toronto, Ont.  
*With Hydro-Electric System.*
3. R. C. FOLLETT (deceased).

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 147

1910—Continued.

2. J. M. FOREMAN, B.A.Sc. (deceased).  
 1. W. J. FOSTER.  
 3.\*W. C. FOULDS, B.A.Sc., 306 Royal Bank Bldg., Toronto, Ont.  
*Imperial Munitions Board.*  
 1. A. FRASER, B.A.Sc. (deceased)  
 2. J. FREDIN,  
 3. H. GALL, B.A.Sc., 103 Queen St. E., Toronto, Ont.  
*Factory Supt., Robertson Bros. Ltd.*  
 1. M. M. GIBSON, B.A.Sc., Princeton, B.C.  
*Gibson & Gibson, O.L.S., C.E.* Whitby, Ont.  
 1. J. M. GIBSON, B.A.Sc., C.E., 1a Havelock St., Toronto, Ont.  
*With B. H. Prack.*  
 1. V. A. E. GOAD, B.A.Sc., Montreal, P.Q.  
*Chas. E. Goad Engineering Co., Ltd.*  
 3. V. S. GOODEVE, Phoenix, B.C.  
 1. H. GOODRIDGE, Edmonton, Alta.  
 2. W. A. GORDON, Wallaceburg, Ont.  
 3. V. F. GOURLAY, B.A.Sc., Galt, Ont.  
*Manufacturer.*  
 3. E. B. GRAHAM, B.A.Sc., Brampton, Ont.  
*Barrister-at-Law.*  
 2. R. L. GREENE, B.A.Sc., 42 Crescent Road, Toronto, Ont.  
 5. J. H. HARRIS, B.A.Sc., 994 Danforth Ave., Toronto, Ont.  
*W. Harris & Co.*  
 1. N. J. HARVIE, B.A.Sc. (Killed in action, France, 1916).  
 1. J. G. HELLIWELL (Killed in action, France, 1915).  
 1. J. F. HENDERSON, Timmins, Ont.  
*Town Engineer.*  
 3. F. G. HICKLING, B.A.Sc., East Pittsburgh, Pa.  
*Westinghouse Electric & Manufacturing Co.*  
 1. E. F. HINCH, 127 Delaware Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1. O. H. HOOVER, B.A.Sc., 513 Eighth Ave. W., Calgary, Alta.  
*Acting Divisional Engineer, Water Power Branch, Dept. of the Interior.*  
 2. P. E. HOPKINS, B.A.Sc., 83 Duggan Ave., Toronto, Ont.  
 3.\*W. J. IRWIN, 1417 Cool St., Wilkinsburg, Pa.  
 2. F. L. JAMES, B.A.Sc., Timmins, Ont.  
*Hollinger Mines.*  
 3. E. A. JAMIESON, A.M.E.I.C., 103 London Bldg., Vancouver, B.C.  
*The Jamieson Eng. Co.*  
 1. C. C. JEFFERY, Toronto, Ont.  
*Asst. Eng., Public Works Dept.*  
 1. H. C. JOHNSTON, 260 St. James St., Montreal, Que.  
*General Manager, H. C. Johnston Co. Ltd.*  
 1. R. H. JOHNSTON, B.A.Sc., 10162 116th St., Edmonton, Alta.  
 1. J. C. KEITH, B.A.Sc., Ouellette St., Windsor, Ont.  
*Border Utilities Co.*  
 2.\*J. T. KING, B.A.Sc., Toronto, Ont.  
*Lecturer in Mining Engineering, University of Toronto.*  
 3. G. A. KINGSTONE, B.A.Sc., 79 Oriole Road, Toronto, Ont.  
*President, Dominion Carbon Brush Co.*  
 2. G. L. KIRWAN, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys Br., Dept. of Interior.*

\*Diploma with honours.

## 1910—Continued.

5. P. T. KIRWAN, B.A.Sc., Box 918, Crockett, California.  
 1. S. KNIGHT, B.A.Sc., Bruce Mines, Ont.  
 3. E. R. LAWLER, 190 University Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 3.\*C. B. LEAVER, B.A.Sc., Montreal, Que.  
*Asst. Superintendent, Imperial Oil Co.*  
 3. R. G. LEE, B.A.Sc., Windsor, Ont.  
*General Manager, The Industrial Engineering Co. of Canada, Ltd.*  
 1. J. N. LEITCH (deceased).  
 1. J. C. LONGSTAFF, New Toronto, Ont.  
 3. J. B. MACDONALD, B.A.Sc., 323 Sayward Bldg., Victoria, B.C.  
*With Cameron Lumber Co., Ltd.*  
 2. A. D. MACDONALD, B.A.Sc., 64 Homewood Ave., Toronto, Ont.  
 1. J. A. MACDONALD, B.A.Sc., 323 Sayward Ave., Victoria, B.C.  
 1. G. A. MACDONALD, B.A.Sc., 360 21st Ave. W., Vancouver, B.C.  
*Private Practice.*  
 1. A. E. MACGREGOR, B.A.Sc., 18 Hilton Ave., Toronto, Ont.  
 1. E. G. MACKAY, B.A.Sc., 606 Bank of Hamilton Chambers,  
Hamilton, Ont.  
 1. G. G. MACLENNAN, B.A.Sc. (Killed in action, France, 1917).  
 1. D. D. MACLEOD, B.A.Sc. (Died of wounds received in action, France,  
1916).  
 3. H. G. MACMURCHY, B.A.Sc., 2400 Oliver Bldg., Pittsburg, Pa.  
*Engineering Dept., Aluminum Co. of America.*  
 3.\*H. J. MACTAVISH, B.A.Sc., Toronto, Ont.  
*Toronto Hydro-Electric System.*  
 4. T. C. MCBRIDE, B.A.Sc., Molson Bank Bldg., London, Ont.  
 1. S. G. McDougall, B.A.Sc., Union Bank Bldg., Ottawa, Ont.  
*Topographical Surveys Branch.*  
 1.\*T. A. MCELHANNEY, B.A.Sc., Ottawa, Ont.  
 1.\*P. J. McGARRY, D. & O.L.S., Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*  
 3.\*L. R. MCKIM, Brantford, Ont.  
 1.\*J. McNIVEN, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 3. J. I. MCSLOY, B.A.Sc., St. Catharines, Ont.  
 2. A. W. R. MAISONVILLE, B.A.Sc., Montreal, Que.  
*Canadian Steel Foundries.*  
 1.\*N. MARR, B.A.Sc., Ottawa, Ont.  
*Water Power Branch, Dept. of Interior.*  
 1.\*W. H. MARTIN, B.A.Sc., Toronto, Ont.  
*Wm. F. Sparling Co., Arch. and Engs.*  
 2. A. C. MATTHEWS, B.A.Sc., 89 St. George St., Toronto, Ont.  
 1. C. H. MEADER, B.A.Sc., O.L.S., Toronto, Ont  
*Colonization Roads Branch, Parliament Buildings.*  
 3.\*H. O. MERRIMAN, B.A.Sc., London, England  
*Research work.*  
 1.\*D. J. MILLER, 45 Penetang St., Orillia, Ont.  
 1. F. S. MILLIGAN, B.A.Sc., Windsor, Ont.  
*John V. Gray Co.*  
 3. P. E. MILLS, B.A.Sc., 320 W. 56th St., New York, N.Y.  
 3. J. P. MORGAN, Toronto, Ont.  
*Hydro Electric Power Commission.*

\*Diploma with honours.

## 1910—Continued.

1. F. R. MORTIMER, B.A.Sc. (deceased).
1. A. H. MUNRO, B.A.Sc., 352 Brock St., Peterborough, Ont.
3. J. C. NASH, B.A.Sc., Hamilton, Ont.  
*Canadian Westinghouse Co.*
- 1.\*V. A. NEWHALL, B.A.Sc., Edmonton, Alta.  
*Dept. of Interior.*
- 2.\*W. E. NEWTON, B.A.Sc., Kaslo, B.C.  
*Silver Bell Mine.*
1. F. T. NICHOL, B.A.Sc., 306 Continental Life Bldg., Toronto, Ont.  
*Supt. Eng., Archibald & Holmes.*
1. C. M. O'NEIL, B.A.Sc., Brooks, Alta.
3. C. E. PALMER, B.A.Sc., E.E., Montreal, Que.  
*Bell Telephone Co.*
3. G. C. PARKER, M.A.Sc., C.E., Parliament Bldgs., Toronto, Ont.  
*Ontario Dept. of Public Highways.*
3. K. K. PEARCE, B.A.Sc., Lachine, Que.  
*Dominion Bridge Co.*
1. A. W. PEARSON, Weston, Ont.
3. C. H. PHILLIPS, B.A.Sc., 85 Manchester Place, Buffalo, N.Y.
1. D. E. PYE (Killed in action, Vimy Ridge sector, 1917).
1. W. S. RAMSAY, B.A.Sc., Toronto, Ont.
3. B. J. REDFERN (deceased).
3. C. E. RICHARDSON, B.A.Sc., Toronto, Ont.  
*Orthopedic Hospital, Christie St.*
1. H. C. RITCHIE, Calgary, Alta.  
*Insurance Agent.*
1. C. W. ROSS, B.A.Sc., Burlington, Ont.
1. W. F. B. RUBIDGE, Port Credit, Ont.
3. W. C. SHAW, B.A.Sc., 114 Park Road, Toronto, Ont.
3. N. C. SHERMAN, Victoria, B.C.  
*L. O. M. Canadian Ordnance Corps.*
- 1.\*W. C. SMITH, B.A.Sc., C.E., 1109 Barclay St., Vancouver, B.C.
2. F. L. SMITH, Burlington, Ont.
5. G. E. SMITH, B.A.Sc., Longford, Ont.  
*Standard Chemical Co.*
2. R. J. SPRY, B.A.Sc., Salt Lake City, Utah.
2. A. L. STEELE, B.A.Sc., Fergus, Ont.  
*Steele Bros.*
- 2.\*H. M. STEVEN, B.A.Sc., Timmins, On.  
*Hollinger Mine.*
- 1.\*L. I. STONE, Toronto, Ont.  
*c/o Resident Engineer, G.T. Ry.*
3. A. L. SUTHERLAND, B.A.Sc., 14 Murray St., Peterborough, Ont.  
*With Canadian General Electric Co.*
3. E. A. TERNAN, B.A.Sc., Leamington, Ont.  
*Automobile Accessories.*
- 5.\*W. H. THOM, 90 Oakwood Ave., Toronto, Ont.  
*Factory Manager, Lyman Bros. & Co.*
3. H. B. THOMPSON, B.A.Sc., Sarnia, Ont.  
*Engineering Dept., Imperial Oil Co.*
3. R. M. A. THOMPSON, B.A.Sc., 221 Kingswood Rd., Toronto, Ont.  
*Hydro-Electric Power Commission.*
- 2.\*C. G. TITUS, Renfrew, Ont.

\*Diploma with honours.

## 1910—Continued.

3. K. M. VAN ALLEN, B.A.Sc. (Died of wounds in German prison camp, 1916).  
 1. L. T. VENNEY, B.A.Sc., *With Morris Knowles, Sanitary Engineer.* Windsor, Ont.  
 1. N. WAGNER, 40 Mt. Royal Ave., Hamilton, Ont.  
 1. R. M. WALKER, B.A.Sc., 346 Kingstone Ave., Montreal, Que.  
 2. T. WALTON, B.A.Sc. (deceased).  
 1. G. A. WARRINGTON, B.A.Sc., 277 Aubrey St., Winnipeg, Man.  
*M.L.S., Parliament Bldgs.*  
 3. M. B. WATSON, B.A.Sc., M.E., C.E., *Director of Engineering, Toronto Technical Schools.* Toronto, Ont.  
 3.\*H. M. WHITE, *With Dominion Bridge Co.* Winnipeg, Man.  
 1. J. L. WHITSIDE, B.A.Sc., (died of wounds received in action, 1916).  
 4. W. S. WICKENS, B.A.Sc., 158 Lytton Blvd., Toronto, Ont.  
 3.\*G. K. WILLIAMS, B.A.Sc. (Killed in collision at Luxeuil, while on active service, 1916).  
 1.\*W. H. WILSON, B.A.Sc., *c/o Moss Iron Works.* Wheeling, W.V.  
 3. G. E. WOODLEY (deceased).  
 1. G. R. WORKMAN, 22 Helena Ave., Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*  
 3. L. A. WRIGHT, B.A.Sc., 61 Dalwich Ave., St. Lambert, Que.  
 3.\*A. W. YOUNELL, B.A.Sc. (died of wounds received in France, 1918).  
 1. W. S. YOUNG, B.A.Sc., Guelph, Ont.

## 1911.

- 5.\*J. AITKEN, B.A.Sc., *c/o Manufacturer's Foundry Co.* Waterbury, Conn.  
 1. L. B. ALLAN, B.A.Sc., *Dept. of Public Works, City Hall.* Toronto, Ont.  
 3. E. G. ARCHER, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*  
 1. L. A. BADGLEY, B.A.Sc., *Architectural Dept., City Hall.* Toronto, Ont.  
 1. T. H. BARTLEY, B.A.Sc., O.L.S., *Toronto Harbour Commissioners.* Toronto, Ont.  
 2.\*H. L. BATTEEN, *Mining Engineer.* Glenc e Lodge, Vancouver, B.C.  
 1. G. L. BERKELEY, 320 Roncesvalles Ave., Toronto, Ont.  
*Toronto Harbour Commissioners.*  
 3.\*J. H. BILLINGS, B.A.Sc., S.M., *Professor of Mechanical Engineering, Drexel Institute.* Philadelphia, Pa.  
 2.\*J. R. BISSETT, B.A.Sc., *Water Power Branch, Dept. of Interior.* Ottawa, Ont.  
 3. W. O. BOSWELL, B.A.Sc. (Died of pleuro-pneumonia while on active service, 1919).  
 1. F. BOWMAN, *Dominion Bridge Co.* Lachine, Que.  
 3. T. W. BRACKINREID, B.A.Sc., *Canadian General Electric Co.* Winnipeg, Man.  
 2. W. M. BROCK, B.A.Sc., *Thamesford, Ont.*  
 1. W. H. D. BROUSE, B.A.Sc., *\* With Gordon C. Edwards.* Toronto, Ont.

## 1911—Continued.

3. H. O. BROWN, B.A.Sc.,  
*Riordon Paper Co.* Mattawa, Ont.
- 3.\*E. T. CAIN, B.A.Sc.,  
*Canadian National Railways.* Moncton, N.B.
1. C. S. CAMERON, 1770 Scarth St., Regina, Sask.  
1. C. D. CAMPBELL, Hamilton, Ont.  
*Manager, Federal Finance Corpn. Ltd.*
- 6.\*W. W. CHADWICK, B.A.Sc., Hamilton, Ont.  
*Manager, Canadian Chadwick Metal Co., Ltd.*
1. R. B. CHANDLER, B.A.Sc., Whalen Building, Port Arthur, Ont.  
1. P. G. CHERRY, B.A.Sc., Toronto, Ont.  
*Secretary and Sales Manager, Might Directories, Ltd.*
3. E. F. CHESNUT, B.A.Sc., Amherstburg, Ont.  
*Brunner Mond Co.*
1. H. J. CLARK, B.A.Sc., Toronto, Ont.  
*Dept. of Public Highways.*
1. F. W. CLARK, 190 University Ave., Toronto, Ont.  
*Field Eng., Hydro-Electric Power Commission.*
3. F. S. CLEARY (deceased).
- 2.\*D. B. COLE, B.A.Sc., Columbus, Ohio  
*Manager, Columbus Cadillac Co.*
- 3.\*A. S. COOK, B.A.Sc., 65-36 Stony Island Ave., Chicago, Ill  
1. C. W. CORNELL, Toronto, Ont.  
*Highways Dept., Parliament Bldgs.*
1. M. E. CROUCH, 14 Algoma St., Port Arthur, Ont.  
3. W. M. CRUTHERS, B.A.Sc., Peterboro', Ont.  
*Can. Gen. Electric Co.*
1. O. F. CUMMINS, Regina, Sask.  
*Provincial Drainage Engineer*
3. T. J. CUNERTY, 17 Battery Place, New York, N.Y.  
*c/o Wonham, Bates & Goode, Trading Corp.*
1. C. H. CUNNINGHAM, B.A.Sc., Hamilton, Ont.  
1. J. H. CURZON, Birchcliffe P.O., Ont.  
*Demonstrator in Drawing, University of Toronto.*
- 3.\*F. K. D'ALTON, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*Asst. Laboratory Eng., Hydro-Electric Power Commission.*
1. W. B. DAVIS, B.A.Sc., Frankford, Ont.  
*Trent Valley Canal.*
3. F. C. DEGUERRE, B.A.Sc. (deceased).
5. L. W. DONCASTER, Toronto, Ont.  
*With Ault & Viborg Co.*
- 3.\*F. H. DOWNING, Edberg, Alta.  
1. W. B. DUNBAR, B.A.Sc., Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*
5. C. H. ECKERT, B.A.Sc., London, Ont.  
*The Tune Co. Aerated Waters.*
3. J. A. ELLIOT, B.A.Sc., Niagara Falls, N.Y.  
*Castner Electrolytic Alkali Co.*
1. G. R. ELLIOTT, B.A.Sc., Canmore, Alta.  
*Mine Engineer, Canmore Coal Co.*
1. C. F. ELLIOTT, B.A.Sc., 229 Yonge St., Toronto, Ont.  
*c/o Elliott Bros.*
1. K. A. FARRELL, B.A.Sc., 104 N. 13th St., Allentown, Pa.  
3. T. J. FARRELLY, Alma, Ont.

## 1911—Continued.

1. S. E. FLOOK, B.A.Sc., Whalen Bldg., Port Arthur, Ont.  
*O. L. Surveyor and Civil Engineer.*
3. C. C. FLYNN, London, Ont.
5. E. L. FRANKEL, B.A.Sc., Toronto, Ont.  
*Frankel Bros.*
2. E. E. FREELAND, B.A.Sc., 638 Church St., Toronto, Ont.
1. J. R. FREEMAN, B.A.Sc., Brighton, Ont.
- 4.\*H. P. FRID, B.A.Sc., 61 Adelaide St. E., Toronto, Ont.  
*Frid Construction Co.*
- 3.\*R. J. FULLER, B.A.Sc., Toronto, Ont.  
*Chief Engineer, John V. Gray Const. Co., Ltd.*
1. H. D. FYFE, North Vancouver, B.C.  
*Mundy Rowland & Co.*
- 5.\*J. L. GOODERHAM, B.A.Sc., 351 Front St. East, Toronto, Ont.  
*Hardy Cartage Co.*
3. R. E. GREEN, B.A.Sc., Kenaston, Sask.
3. E. A. GREENE, B.A.Sc., 139 Cottingham St., Toronto, Ont.  
*Lumsden & Greene.*
3. H. G. HALL, Ingersoll, Ont.  
*With Hydro-Electric System.*
1. G. M. HAMILTON, B.A.Sc., New Hamburg, Ont.
2. H. E. HAROURT, Box 189, Trenton, Ont.  
*Mgr., Benedict Proctor Mfg. Co.*
3. M. B. HASTINGS, 62 Front St. W., Toronto, Ont.  
*Secretary, A. H. Winter-Joyner Co., Ltd.*
2. M. B. HEEBNER, B.A.Sc., Swanton, Vt.  
*Supt., Municipal Corpns.*
2. F. I. HELSON, Ottawa, Ont.  
*Dept. of Justice.*
3. H. R. HILL, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. A. J. HUFF, B.A.Sc., 108 Eighth St., Edmonton, Alta.
1. K. HUFFMAN, 292 Wright Ave., Toronto, Ont.  
*Resident Engineer, C.N.R.*
- 1.\*H. HYATT, B.A.Sc., Philadelphia, Pa.  
*With C. H. Wheeler Mfg. Co.*
- 1.\*R. H. JARVIS, B.A.Sc. (Accidentally killed while on overseas service, 1918).
- 1.\*L. E. JONES, Toronto, Ont.  
*Highways Dept., Parliament Buildings.*
- 1.\*E. A. KELLY, Winnipeg, Man.  
*Construction Dept., C.P.R.*
- 3.\*M. KIRKWOOD, B.A.Sc., New York, N.Y.  
*Am. Telephone and Telegraph Co.*
- 2.\*J. LANNING, B.A.Sc., O.L.S., Cochrane, Ont.  
*Engineer and Ontario Land Surveyor.*
1. N. LAWLESS, (died of pneumonia, France, 1915). Detroit, Mich.
3. W. R. LETHBRIDGE, Smith, Hinchman & Grylls.
2. M. I. LIEBERMAN, B.A.Sc., 700 Queen Street W., Toronto, Ont.
3. G. L. LILLIE, B.A.Sc., Toronto, Ont.  
*Toronto Hydro-Electric System.*
6. A. L. LONG, B.A.Sc., Toronto, Ont.
- 1.\*A. W. P. LOWRIE, B.A.Sc., Calgary, Alta.  
*Dept. of Interior Reclamation Service.*
7. W. M. MACANDREW, B.A.Sc., Whonnock, B.C.

\*Diploma with honours.

## 1911—Continued.

3. R. V. MACAULEY, B.A.Sc.,  
*Bell Telephone Co.* Montreal, Que.
- 2.\*J. T. MACBAIN,  
*Union Carbide Co.* Niagara Falls, N.Y.
- 1.\*R. E. A. MACBETH, B.A.Sc. (Accidentally killed while on overseas service, 1918).
1. F. M. MACDONALD, B.A.Sc. 3 Rusholme Rd., Toronto, Ont.
- 3.\*W. S. MACKENZIE,  
*Smith, Hinchman & Grylls.* 126 Melbourne Ave., Detroit, Mich.
5. J. A. MACKINNON, B.A.Sc.,  
*Great West Life Assurance Co.* 212 17th Ave. West, Calgary, Alta.
- 1.\*J. G. MACLAURIN, B.A.Sc.,  
*Algoma Steel Corpn.* Sault Ste. Marie, Ont.
1. J. B. MCANDREW, B.A.Sc., 70 Church St., St. Catharines, Ont.
- 3.\*J. A. McEACHREN, Strathburn, Ont.
3. R. W. MCELROY, B.A.Sc.,  
*c/o Russell Gallagher.* R.R. No. 4, Hamilton, Ont.
3. H. J. MC EWEN, B.A.Sc. Brantford, Ont.
- 3.\*W. G. McGHIE, B.A.Sc., Apt. 3, 105 Chomedy St., Montreal, Que.
3. D. A. McKENZIE, B.A.Sc.,  
*With Hydro-Electric Power Commission.* Toronto, Ont.
2. A. J. McLAREN, B.A.Sc.,  
*c/o Foundation Co. of Canada.* 224 James St., Montreal, Que.
3. A. G. MC LEISH,  
*Private Practice.* 13 Fleming St., Toronto, Ont.
- 1.\*R. A. MCLELLAN, B.A.Sc.,  
*With Murphy & Underwood.* Saskatoon, Sask.
2. W. B. MCPHERSON, B.A.Sc.,  
*Barrister-at-law.* 6 King St. W., Toronto, Ont.
3. A. A. MCQUEEN, B.A.Sc.,  
*A. L. McCredil.* Box 36, St. Mary's, Ont.
- 4.\*H. H. MADILL, B.A.Sc., Registered Architect, Toronto, Ont.  
*Lecturer in Architecture, University of Toronto.*
3. J. C. MARTIN, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
3. C. A. MEADOWS, B.A.Sc.,  
*Geo. B. Meadows Co.* 6 Sussex Ave., Toronto, Ont.
1. L. G. MILLS, B.A.Sc., 89 Glen Road, Toronto, Ont.
5. L. C. MITCHELL,  
*Chief Chemist, Continental Sugar Co.* Blissfield, Mich.
2. J. A. MORPHY, B.A.Sc., Box 455, Oshawa, Ont.
1. M. H. MURPHY, B.A.Sc.,  
*Contractor.* Toronto, Ont.
1. J. C. MURTON,  
*With Victoria Turbine Mixer Co., Ltd.* 102 Tyndall Ave., Toronto, Ont.
3. E. H. NIEBEL, B.A.Sc. (deceased). Detroit, Mich.
3. C. K. NIXON, B.A.Sc., Timmins, Ont.
3. E. S. NOBLE, B.A.Sc.,  
*Northern Canadian Power Co.*
1. R. K. NORTHEY, B.A.Sc., Regina, Sask.  
*Dominion Lime and Coal Co.*
2. W. A. O'FLYNN, B.A.Sc., Cobalt, Ont.  
*Temiskaming Mine.*
1. W. V. OKE, B.A.Sc., 265 Delaware Ave., Toronto, Ont.

\*Diploma with honours.

## 1911—Continued.

2. J. A. ORR, B.A.Sc., Creighton Mine, Ont.  
*Surveyor, International Nickel Co.*
3. J. S. PARKER, B.A.Sc., Toronto, Ont.  
*Municipal Eng., Hydro-Electric Power Commission.*
- 3.\*J. H. PARKIN, B.A.Sc., M.E., Toronto, Ont.  
*Asst. Professor of Mechanical Engineering, University of Toronto.*
- 1.\*J. McD. PATTON, B.A.Sc., Regina, Sask.  
*Dept. of Highways.*
3. C. L. PEARSON, Calgary, Alta.  
*With City of Calgary.*
3. S. J. PEPLER. (Killed in action, France, 1917).
- 3.\*W. J. PERRIN, B.A.Sc. (deceased).
1. B. W. PICK, B.A.Sc., Norwich, Ont.
- 3.\*E. H. PORTE, Renfrew, Ont.
- 1.\*F. M. PRATT, B.A.Sc., 343 Nepeau Street, Ottawa, Ont.
4. H. PULLAN, Toronto, Ont.  
*With E. Pullan.*
1. L. J. QUINLAN, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*
1. L. W. RAILTON, Prai, Strait Settlements.  
*Tophane, Jones & Railton.*
- 1.\*J. E. RATZ, B.A.Sc., D.T.S. Ottawa, Ont.  
*Geodetic Survey, Dept. of the Interior.*
1. F. N. READ, B.A.Sc. (Killed in action, Passchendaele, 1917).
4. E. V. REID (Killed in action, France, 1917)
- 1.\*W. A. RICHARDSON, B.A.Sc., Courtenay, Vancouver Is., B.C.  
*Asst. Dist. Eng., Dept. of Pub. Works.*
- 1.\*W. E. ROBINSON, B.A.Sc., c/o Perfection Lodge, Calgary, Alta.
1. H. L. ROBLIN, B.A.Sc., 406 Tegler Bldg., Edmonton, Alta.  
*Canadian National Railway*
3. L. W. ROTHERY, B.A.Sc., 214 N. 22nd St., Philadelphia, Pa.
- 4.\*T. L. F. ROWE, Whitby, Ont.  
*Manager, Ford Garage.*
3. A. S. RUNCIMAN, Montreal, Que.  
*Marconi Wireless Telegraph Co.*
3. F. G. RUTLEY, B.A.Sc., Sydney, N.S.  
*Foundation Co. of Montreal.*
1. E. M. SALTER, 901 Boyd Bldg., Winnipeg, Man.
1. F. R. SCANDRETT, B.A.Sc., Toronto, Ont.  
*Toronto Harbour Commission.*
5. MISS H. E. SCOTT, B.A.Sc. (MRS. HARRY SCALES)  
 107 N. 21st Ave., Phoenix, Arizona
- 5.\*J. W. SCOTT, B.A.Sc., Toronto, Ont.  
*Chief Chemist, Research Dept., T. Eaton Co.*
3. N. D. SEATON, B.A.Sc., 360 Stewart St., Peterboro, Ont.  
*With General Electric Co.*
1. D. N. SHARPE, New Civic Bldg., Winnipeg, Man.  
*Greater Winnipeg Water District.*
- 4.\*P. SHEARD, B.A.Sc., 314 Jarvis Street, Toronto, Ont.
- 1.\*W. A. SIBBETT, D. & O.L.S., Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*
- 2.\*C. P. SILLS, B.A.Sc., Seaforth, Ont.
- 1.\*K. H. SMITH, Halifax, N.S.  
*Nova Scotia Power Commission.*

## 1911—Continued.

3. M. L. SMITH, B.A.Sc. (deceased).
1. R. G. SNEATH, 63 Garden Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
- 3.\*G. E. SQUIRE, B.A.Sc., Toronto, Ont.
3. W. S. STEELE, B.A.Sc. (deceased).
- 5.\*A. E. STEWART, B.A.Sc., 136 Bedford Rd., Toronto, Ont.
- 3.\*R. O. STEWART, B.A.Sc., Moncton, N.B.  
*Bridge Dept., Intercolonial Ry.*
- 3.\*R. A. STORY, B.A.Sc., 195 10th Ave. W., Vancouver, B.C.  
*B.C. Telephone Co.*
1. C. F. SZAMMERS, Sudbury, Ont.  
*Supt. Eng., Sherwood Construction Co.*
3. R. TAYLOR, B.A.Sc., New York, N.Y.  
*Instructor, Dept. of Mechanical Eng., Columbia University.*
1. J. B. TEMPLE, B.A.Sc., Toronto, Ont.  
*Toronto Iron Works.*
3. G. C. THOMAS, Toronto, Ont.  
*With Hydro-Electric Power Commission.*
1. R. D. TORRANCE, B.A.Sc., Guelph, Ont.  
*c/o Royal Bank of Canada.*
1. W. G. TOUGH, B.A.Sc. (Died of wounds received in action, Sept. 1918).
- 1.\*N. VICKERS. (Died of wounds received in action, April 1917).
2. J. H. C. WAITE, B.A.Sc., Porcupine, Ont.  
*Manager, Keora Mining Co.*
1. W. D. WALCOTT, B.A.Sc., C.E., 8 Strachan Ave., Toronto Ont.  
*With Hydro-Electric Power Commission.*
3. G. L. WALLACE, B.A.Sc., Toronto, Ont.  
*With Thos. W. Lamb, Architect.*
1. A. WARDELL, B.A.Sc., 4 Williamson Road, Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*
1. F. E. WATSON, B.A.Sc., 447 Manning Ave., Toronto, Ont.
- 3.\*P. G. WELFORD, B.A.Sc., Guelph, Ont.  
*White Sewing Machine Co.*
2. A. G. WHEELER, B.A.Sc., Jackson's Point, Ont.
3. G. H. WILKES, B.A.Sc., 40 West Main St., Galt. Ont.
- 5.\*E. R. WILLIAMS, 43 Kendal Ave., Toronto, Ont.
- 3.\*H. A. WILSON, Glenora, Ont.  
*Supt., J. C. Wilson & Co., Mechanical Engineers.*
3. C. S. WOOD, Courtenay, B.C.  
*Electrical Engineer.*
1. W. G. WORDEN, B.A.Sc., Toronto, Ont.  
*Chief, Engineer, Dufferin Construction Co. Ltd.*
- 1.\*W. J. T. WRIGHT, B.A.Sc., Toronto, Ont.  
*Lecturer in Drawing, University of Toronto.*
1. F. H. WRONG, B.A.Sc., D.L.S., 355 Bedford St., Sandwich, Ont.
2. W. H. WYLIE, B.A.Sc., Timmins, Ont.  
*Hollinger Mining Co.*
3. H. K. WYMAN, B.A.Sc., Toronto, Ont.  
*Eng. Dept. Can. Gen. Elec. Co.*
3. L. P. YORKE, 282 Glendale Ave., Highland Park, Detroit, Mich.

\*Degree with honours.

1911—Continued.



Owing to change of course from three to four years, there were no graduates in 1912.

1913.

From this date onward "3" denotes Mechanical Engineering and "7" Electrical Engineering.

- |  |                                      |
|--|--------------------------------------|
| 7.*R. J. ALLEN, B.A.Sc.,                                     | 149 Summer Ave., Springfield, Mass.  |
| 3.*A. S. ANDERSON, B.A.Sc., (killed in action, France, 1916) | Ottawa, Ont.                         |
| 1.*C. R. AVERY, M.A.Sc.,                                     |                                      |
| Administrative Branch, D.S.C.R.                              |                                      |
| 4.*L. C. M. BALDWIN, B.A.Sc.,                                | Forest Hill Road, Toronto, Ont.      |
| <i>Demonstrator in Drawing, University of Toronto.</i>       |                                      |
| 1. F. W. BEATTY, B.A.Sc.,                                    | Pembroke, Ont.                       |
| 1.*W. B. BEATTY, B.A.Sc., O.L.S.,                            | 197 Catherine St. S., Hamilton, Ont. |
| <i>Hamilton Bridge Works.</i>                                |                                      |
| 2. C. A. BELL, B.A.Sc.,                                      | 107 La Merchant St., Halifax, N.S.   |
| 7. R. S. BELL, B.A.Sc.,                                      | Akron, Ohio.                         |
| 2. R. E. BINNS, B.A.Sc.,                                     | 18 Dorville Rd., Lee, London, S.E.   |
| 1.*B. S. BLACK, B.A.Sc.,                                     | Toronto, Ont.                        |
| <i>Hydro-Electric Power Commission.</i>                      |                                      |
| 1. D. BLAIN, B.A.Sc.,  | 42 Clarendon Ave., Toronto, Ont.     |
| <i>With Eby-Blain Co.</i>                                    |                                      |
| 7. E. R. BONTER, B.A.Sc.,                                    | Montreal, Que.                       |
| <i>Canadian Crocker-Wheeler Co.</i>                          |                                      |
| 7.*L. R. BRERETON, B.A.Sc.,                                  | 6 May St., Toronto, Ont.             |
| 4. B. BROWN, B.A.Sc.,  | 313 Manning Chambers, Toronto, Ont.  |
| <i>Architect.</i>  |                                      |
| 2. T. R. BUCHANAN, B.A.Sc.,                                  | Thessalon, Ont.                      |
| 7.*W. B. BUCHANAN, B.A.Sc.,                                  | 8 Strachan Ave., Toronto, Ont.       |
| <i>With Hydro-Electric Power Commission.</i>                 |                                      |
| 3. B. H. A. BURROWS, B.A.Sc.,                                | (killed in action, France, 1916).    |
| 2. W. B. CALDWELL, B.A.Sc.,                                  | Kimberley, B.C.                      |
| <i>Sullivan Mine, Consolidated Mining &amp; Smelting Co.</i> |                                      |
| 1. O. L. CAMERON, B.A.Sc. (Died of wounds, France, 1918).    |                                      |
| 1. L. L. CAMPBELL, B.A.Sc.,                                  | Toronto, Ont.                        |
| <i>Hydro-Electric Power Commission.</i>                      |                                      |
| 3.*R. M. CARMICHAEL, B.A.Sc.,                                | Toronto, Ont.                        |
| <i>Hydro-Electric Power Commission.</i>                      |                                      |
| 1. G. M. CARRIE, B.A.Sc.,                                    | 686 E. 4th Ave., Owen Sound, Ont.    |
| 2. H. A. CLARK, B.A.Sc.,                                     | 669 Spadina Ave., Toronto, Ont.      |
| 6.*G. E. CLARKSON, B.A.Sc.,                                  | Scunthorpe, England.                 |
| <i>Asst. Supt. Frodingham Iron &amp; Steel Co.</i>           |                                      |
| 3.*B. D. CLEGG, B.A.Sc.,                                     | 275 Bishop St., Montreal, Que.       |
| 7. J. H. COLEMAN, B.A.Sc.,                                   | Toronto, Ont.                        |
| <i>Coleman Theatre Equipment Co., 12 Queen St. E.</i>        |                                      |
| 1.*G. M. COOK, B.A.Sc.,                                      | Youngstown, Ohio.                    |
| <i>Chief Estimator, Truscon Steel Co.</i>                    |                                      |

\*Degree with honours.

## 1913—Continued.

1. J. A. COOMBS, B.A.Sc., <i>Minto Coal Co.</i>	Minto, N.B.
4.*B. R. COON, B.A.Sc.,	356 Russell Hill Rd., Toronto, Ont.
2. W. T. CURTIS, B.A.Sc., <i>Mine Foreman, Hollinger Mine.</i>	Timmins, Ont.
1. A. J. DATES, B.A.Sc., <i>Contractor.</i>	35 Farrand Park, Detroit, Mich.
3. H. D. DAVISON, B.A.Sc., <i>Section 1, Welland Ship Canal.</i>	Port Weller, Ont.
7. E. L. DELTCH, B.A.Sc., <i>Works Eng., Electro Metals, Ltd.</i>	Welland, Ont.
2.*R. W. DIAMOND, B.A.Sc., <i>Consolidated Mining &amp; Smelting Co.</i>	Trail, B.C.
7. W. G. DUNCAN, B.A.Sc.	Port Dover, Ont.
1. F. R. FIDDES, B.A.Sc. (deceased).	
1. D. H. FLEMING, B.A.Sc., <i>City Engineer.</i>	Owen Sound, Ont.
3. F. F. FOOTE, B.A.Sc.,	Merriton, Ont.
1.*J. S. GALBRAITH, B.A.Sc., <i>Consulting Engineer.</i>	Seattle, Wash.
2. W. H. GARNHAM, B.A.Sc. (deceased).	
1. A. M. GERMAN, B.A.Sc., <i>Canadian Dredging Co.</i>	Pt. Robinson, Ont.
1. H. M. GOODMAN, B.A.Sc.,	Room 34, Molson Bldg., 14 St. John St., Montreal, Que.
1. A. G. GRAY, B.A.Sc.,	8 Dale Ave., Toronto, Ont.
1.*E. R. GRAY, B.A.Sc., C.E., <i>City Engineer.</i>	Hamilton, Ont.
3. A. J. GRAY, B.A.Sc., <i>D.S.C.R. Artificial Limb Factory.</i>	Toronto, Ont.
7. J. P. HADCOCK, B.A.Sc., <i>Can. Gen. Elec. Co.</i>	Peterboro, Ont.
7. H. C. HARRIS, B.A.Sc.,	Kingsville, Ont.
1. H. A. HAWLEY, B.A.Sc., <i>Lewis Construction Co.</i>	168 Madison Ave., Toronto, Ont.
1.*R. L. HEARN, B.A.Sc., <i>Hydro-Electric Power Com.</i>	190 University Ave., Toronto, Ont.
1.*H. J. HEINONEN, B.A.Sc.,	57 N. Sprague Ave., Bellevue, Pa.
3.*R. A. HENRY, B.A.Sc., <i>Collingwood Shipbuilding Co.</i>	Collingwood, Ont.
7.*T. A. HILL, B.A.Sc.,	Ninga, Man.
1.*O. HOLDEN, B.A.Sc., <i>Hydro-Electric Power Commission.</i>	Toronto, Ont.
1. J. T. HOWARD, B.A.Sc. (Died of wounds, France, 1918).	
7.*T. F. HOWLETT, B.A.Sc., <i>Harris Abattoir Co., Ltd.</i>	85 Hounslowheath Rd., Toronto, Ont.
1. E. T. IRESON, B.A.Sc.,	144 Walmer Rd., Toronto, Ont.
1. G. R. JOHNSON, B.A.Sc.,	Fernie, B.C.
1. R. L. JUNKIN, B.A.Sc.,	Alexandra Apts., Toronto, Ont.
7.*S. S. KELLY, B.A.Sc.,	Lambeth, Ont.
7. A. E. KERR, B.A.Sc., <i>Can. Westinghouse Co.</i>	Hamilton, Ont.
7. C. E. KILMER, B.A.Sc., <i>Commercial Credits Co.</i>	64 Alvin Ave., Toronto, Ont.

\*Degree with honours.

## 1913—Continued.

1. J. S. LAING, B.A.Sc., Essex, Ont.  
 7. A. LESLIE, B.A.Sc., 114 Bay St., Toronto, Ont.  
*Commercial Credits Co.*
- 4.\*H. D. LIVINGSTON, B.A.Sc. (Killed in action, August, 1918).  
 1.\*K. F. MICKLEBOROUGH, B.A.Sc., British Guiana, S.A.  
 7.\*G. J. MICKLER, B.A.Sc., 190 University Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*
1. N. C. MILLMAN, B.A.Sc., 490 Huron St., Toronto, Ont.  
 1. F. J. MULQUEEN, B.A.Sc., Cobourg, Ont.  
*Cobourg Dye Works.*
- 1.\*W. C. MURDIE, M.A.Sc., D.L.S., F.R.G.S., Ottawa, Ont.  
*Geodetic Survey, Department of Interior.*
2. D. A. S. MUTCH, B.A.Sc., Thorold, Ont.  
*Supt., Coniagas Smelter.*
- 1.\*H. R. MACKENZIE, B.A.Sc., Regina, Sask.  
*Inspecting Engineer, Board of Highway Commissioners.*
1. A. R. MACPHERSON, B.A.Sc., 25 Arthur St., Brantford, Ont.  
 6.\*K. S. MACLACHLAN, B.A.Sc., Merritton, Ont.  
*Lincoln Paper Mills.*
1. W. H. MACTAVISH, B.A.Sc., Ottawa, Ont.  
*Geodetic Survey, Dept. of Interior.*
1. T. V. McCARTHY, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*With Hydro-Electric Power Comm.*
- 4.\*R. S. McCONNELL, B.A.Sc., 22 Montague Place, Toronto, Ont.  
*Brown & McConnell, Architects.*
1. W. L. MCFAUL, B.A.Sc., Sault Ste. Marie, Ont.  
*City Engineer.*
- 2.\*K. L. NEWTON, B.A.Sc., Copper Cliff, Ont.  
*International Nickel Co., Ltd., of Canada.*
- 5.\*C. J. OTTO, B.A.Sc., Toronto, Ont.  
*Gutta Percha and Rubber Mfg. Co.,*
- 1.\*N. F. PARKINSON, M.A.Sc., 22 Vittoria St., Ottawa, Ont.  
*Deputy Minister, Dept. Soldiers' Civil Re-establishment.*
- 7.\*J. W. PEART, B.A.Sc., 61 Pearl St., St. Thomas, Ont.  
 1.\*J. E. PERRON, B.A.Sc., Metabetchouan, Que.  
 1. J. J. PHILLIPS, B.A.Sc., Box 188, Prince George, B.C.  
*Eng. Dept., G.T. Ry.*
1. H. C. QUAIL, B.A.Sc. (Killed in action, February, 1918).  
 7\*E. G. RATZ, B.A.Sc., Hamilton, Ont.  
*With Canadian Westinghouse Co.*
- 1.\*J. M. RIDDELL, B.A.Sc., Ottawa, Ont.  
*Geodetic Survey, Dept. of the Interior.*
- 1.\*J. E. RITCHIE, B.A.Sc., 149 University Avenue, Toronto, Ont.  
*With Ontario Fire Marshall.*
- 1.\*C. S. ROBERTSON, M.A.Sc., Toronto, Ont  
*With John ver Mehr Eng. Co., Ltd.*
- 7.\*C. C. ROUS, B.A.Sc., Walkerville, Ont.  
*Metallurgical Engineer, Division General Motors of Canada.*
7. C. H. RUSSELL, B.A.Sc., Hamilton, Ont.  
*Can. Westinghouse Co.*
- 7.\*A. A. SCARLETT, B.A.Sc., 83 Leinster Ave., Hamilton, Ont.  
*International Plough Works.*
- 1.\*R. L. SEWELL, B.A.Sc., R.R. No. 1, Markham, Ont.

\*Degree with honours.

## 1913—Continued.

- 7.\*M. C. SHARP, B.A.Sc., 1058 Ossington Ave., Toronto, Ont.  
 3.\*K. E. SHAW, B.A.Sc., Walkerville, Ont.  
*Canadian Bridge Co.*  
 3.\*F. R. SIMS, B.A.Sc., Ottawa, Ont.  
*Dept. of Customs.*  
 2.\*D. G. SINCLAIR, B.A.Sc., Creighton Mines, Ont.  
*International Nickel Co.*  
 4.\*R. W. SOPER, B.A.Sc. (Killed in action, France, 1918).  
 1. W. A. SPELLMAN, B.A.Sc., Hastings, Ont.  
*c/o Arthur Spellman.*  
 7.\*J. M. STRATHY, B.A.Sc., (killed in action, 1916).  
 1. D. SUTHERLAND, B.A.Sc., 21 Rose Ave., Toronto, Ont.  
 1. R. TASKER, B.A.Sc., 57 Duke Street, Toronto, Ont.  
 1.\*J. M. THOMPSON, B.A.Sc. Mount Healy, Ont.  
 2.\*W. K. THOMPSON, B.A.Sc., Calumet, Mich.  
*Calumet and Hecla Mining Co.*  
 7.\*D. J. THOMSON, B.A.Sc., 86 Abbott Ave., Toronto, Ont.  
*Staff Technical School.*  
 7. T. E. TORRANCE, B.A.Sc., Toronto, Ont.  
*Bell Telephone Co.*  
 2. R. M. TROW, B.A.Sc., Stratford, Ont.  
*Williams Trow Knitting Co., Ltd.*  
 1.\*W. G. URE, B.A.Sc., Woodstock, Ont.  
*W. F. Ure & Son.*  
 1.\*C. F. VON GUNTEN, B.A.Sc., 1422 Hurt Bldg., Atlanta, Ga.  
*American Telephone and Telegraph Co.*  
 3. R. E. WATTS, B.A.Sc. (Died of scarlet fever while on active service, 1916).  
 3.\*C. A. WEBSTER, B.A.Sc., Galt, Ont.  
*Galt Foundry Co. Ltd.*  
 4.\*H. WEBSTER, B.A.Sc., 306 Russell Hill Rd., Toronto, Ont.  
 1. D. H. WEIR, B.A.Sc., London, Ont.  
*Technical School.*  
 1. W. S. WINTERS, B.A.Sc., 606 Ontario St., Toronto, Ont.  
 1. R. F. B. WOOD, B.A.Sc., 26 Colin Ave., Toronto, Ont.  
 7.\*A. J. WRIGHT, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*  
 7. R. B. YOUNG, B.A.Sc., C.E., 8 Strachan Ave., Toronto, Ont.  
*Asst. Laboratory Engineer, Hydro-Electric Power Commission.*

## 1914

1. E. M. ABENDANA, B.A.Sc. (Died while on active service, Oct. 1918).  
 1.\*F. C. ADSETT, B.A.Sc., Trenton, Ont.  
*c/o Hydro-Electric Power Commission.*  
 1.\*J. L. ALTON, B.A.Sc., Lucknow, Ont.  
 2.\*F. C. ANDREWS, B.A.Sc. (killed in action, France, 1915).  
 7. C. E. ARMER, B.A.Sc., 38 Palmerston Gardens, Toronto, Ont.  
*With Ewart, Jacob & Byam, Elec. Engrs.*  
 2.\*H. R. BANKS, B.A.Sc., 787 Markham St., Toronto, Ont.

\*Degree with honours.

## 1914—Continued.

1. E. L. BEDARD, B.A.Sc.,  
c/o Imperial Oil Co., Ltd. Ioco, B.C.
- 1.\*H. J. BEDARD, B.A.Sc., Port Lambton, Ont.
1. J. T. BELCHER, B.A.Sc., Nipigon, Ont.  
*With H.E.P.C.*
1. S. G. BENNETT, B.A.Sc., Toronto, Ont.  
*Lecturer in Commercial Engineering, University of Toronto.*
1. P. V. BINNS, B.A.Sc. (Killed in action, France, 1918).
- 1.\*J. M. BLYTH, B.A.Sc., R.R. No. 3, Durham, Ont.
5. A. R. BONHAM, B.A.Sc., 1798 Dufferin St., Toronto, Ont.  
*Laboratory, Provincial Board of Health.*
- 1.\*J. H. W. BOWER, B.A.Sc., Ottawa, Ont.  
*Gen. Supt., Military Hospitals Comm.*
- 3.\*H. H. BROWN, B.A.Sc., Gravenhurst, Ont.
- 7.\*W. D. BROWN, B.A.Sc., Owen Sound, Ont.
- 1.\*D. H. CAMPBELL, B.A.Sc., Ottawa, Ont.  
*Topographical Surveys Branch, Dept. of Interior.*
- 3.\*H. M. CAMPBELL, B.A.Sc., St. Catharines, Ont.  
*Production Manager, Whitman & Barnes, Mfg., Co.*
- 1.\*J. J. CAMPBELL, B.A.Sc. (Died of wounds received in action, France, 1917).
- 6.\*C. N. CANDEE, B.A.Sc., 20 Chesnut Park Rd., Toronto, Ont.  
*Synthetic Drug Co.*
2. R. T. CARLYLE, B.A.Sc., 64 Rosehill Ave., Toronto, Ont.
2. J. M. CARTER, B.A.Sc., 125 Hilton Ave., Toronto, Ont.
2. E. V. CHAMBERS, B.A.Sc., Athelma Apts., 79 King E., Toronto, Ont.
- 1.\*R. M. CHRISTIE, B.A.Sc., 9847 91st Ave., Edmonton South, Alta.  
*Clipsham & Delamere.* Toronto, Ont.
7. C. E. B. CORBOULD, B.A.Sc., Kamloops, B.C.  
*Hydrometric Survey.*
- 3.\*E. D. W. COURTICE, B.A.Sc., 18 Harvey St., Chatham, Ont.
1. J. W. CRASHLEY, B.A.Sc., 26 Charles East, Toronto, Ont.
- 7.\*A. W. CRAWFORD, B.A.Sc., Ottawa, Ont.  
*Asst. to Director of Technical Education, Dept. of Labour.*
- 1.\*W. CUTHERBERTSON, B.A.Sc., Shackleton, Sask.
1. G. F. DALTON, B.A.Sc., 342 McLaren St., Ottawa, Ont.  
*Geodetic Survey, Dept. of the Interior.*
- 1.\*R. DASHWOOD, B.A.Sc., Midland, Ont.  
c/o Dr. Raikes.
- 1.\*R. D. DAVIDSON, B.A.Sc., Alliston, Ont.
3. R. D. DELAMERE, B.A.Sc., Guelph, Ont.  
*Dept. Soldiers' Civil Re-establishment.*
- 1.\*F. W. DOUGLAS, B.A.Sc., 525 W. 124th St., New York, N.Y.  
c/o Wm. Scott.
7. H. C. EDWARDS, B.A.Sc., Toronto, Ont.  
*Crompton Car Co.*
- 7.\*H. F. ELLIOTT, B.A.Sc., Alliance, Ohio  
*Morgan Eng. Co.*
1. J. A. ELLIOTT, B.A.Sc., 903 Ferry Ave., Niagara Falls  
*Castner Electrolytic Alkali Co.*
- 2.\*S. D. ELLIS, B.A.Sc. (Died after operation, while on overseas service, 1916).

\*Degree with honours.

1914—Continued.

1.*H. E. EYRES, B.A.Sc.,	Peterborough, Ont.
1.*O. M. FALLS, B.A.Sc.,	71 Olive Ave., Toronto, Ont.
7. D. G. FERGUSON, B.A.Sc.,	Toronto, Ont. <i>Hydro-Electric Power Commission.</i>
1. G. O. FLEMING, B.A.Sc.,	Bathurst St. & St. Clair Ave., Toronto, Ont.
2. J. S. FLEMING, B.A.Sc. (Killed in action, France, 1916).	
1.*J. L. FOREMAN, B.A.Sc.,	Collingwood, Ont.
7.*H. J. FRANKLIN, B.A.Sc.,	Toronto, Ont. <i>Demonstrator in Drawing, University of Toronto.</i>
5.*J. G. G. FROST, B.A.Sc.,	Cleveland, Ohio. <i>Savell &amp; Frost, Consulting Chemists.</i>
1. C. H. R. FULLER, B.A.Sc.,	Chatham, Ont. <i>City Engineer.</i>
7.*E. I. GILL, B.A.Sc.,	Toronto, Ont. <i>Sheppard &amp; Gill Lbr. Co.</i>
2.*J. R. GILL, B.A.Sc.,	Sudbury, Ont. <i>British-American Nickel Corp.</i>
1. R. W. GOUINLOCK, B.A.Sc.,	Toronto, Ont. <i>Canada Bond Corporation, Ltd.</i>
7. C. I. GRIERSON, B.A.Sc.,	Hamilton, Ont. <i>With Imperial Oil Company.</i>
3.*W. H. HALL, B.A.Sc.,	Toronto, Ont.
3.*G. H. HALLY, B.A.Sc.,	215 Avenue Rd., Toronto, Ont.
1.*J. J. HANNA, B.A.Sc.,	346 18th Ave. W., Calgary, Alta.
1. J. H. HAWES, B.A.Sc.,	Ottawa, Ont. <i>Topographical Surveys, Dept. of Interior.</i>
1.*L. T. HAYMAN, B.A.Sc.,	869 Dundas St., London, Ont.
1.*B. B. HOGARTH, B.A.Sc.,	Ottawa, Ont. <i>Dominion Water Power Branch, Dept. of the Interior.</i>
4. E. E. HUGLI, B.A.Sc.,	Toronto, Ont. <i>Hydro-Electric Power Commission.</i>
1.*S. A. HUSTWITT, B.A.Sc.,	76 Roncesvalles Ave., Toronto, Ont. <i>City Architects Dept.</i>
2. W. HUTCHINGS, B.A.Sc.,	Cobalt, Ont. <i>Chemist, O'Brien Mine.</i>
7.*A. S. JANNATI, B.A.Sc.,	Chatham, Ont. <i>With Hydro-Electric Power Commission.</i>
1.*R. P. JOHNSON, B.A.Sc.,	Box 245, Niagara Falls, Ont. <i>With Hydro-Electric Power Commission.</i>
7.*J. I. KAMMAN, B.A.Sc.,	35 Hand St., Rochester, N.Y.
1. J. KAY, B.A.Sc. (Died while on active service, 1918).	
4. N. G. KEEFER, B.A.Sc.,	303 Lonsdale Rd., Toronto, Ont. <i>With Wickson &amp; Gregg.</i>
3. H. S. KERBY, B.A.Sc.,	Mt. Royal College, Calgary, Alta.
3. J. A. KERR, B.A.Sc.,	Kitchener, Ont. <i>Eng. Dept. of Dominion Fire Factory.</i>
7. G. E. KEWIN, B.A.Sc.,	Toronto, Ont. <i>With Hydro-Electric Power Commission.</i>
1. J. A. KNIGHT, B.A.Sc.,	Toronto, Ont. <i>Hydro-Electric Power Commission.</i>
2.*S. A. LANG, B.A.Sc. (Died at St. Johns, Que., while on active service, Oct. 1918).	

\*Degree with honours..

## 1914—Continued.

- 7.\*C. W. LATIMER, B.A.Sc., Chatham, Mass.  
*Radio Corporation of America.*
- 1.\*R. E. LINDSAY, B.A.Sc., University Club, Vancouver, B.C.  
 7. N. H. LORIMER, B.A.Sc., Toronto, Ont.  
*Otis-Fenson Elevator Co.*
- 5.\*O. G. LYÉ, B.A.Sc., Guelph, Ont.  
*Technical Mgr., Malt Products Co., Ltd.*
- 2.\*W. A. MACDONALD, B.A.Sc. (deceased).
3. B. MACKENDRICK, B.A.Sc., Galt, Ont.
- 2.\*H. J. MACKENZIE, B.A.Sc., 495 Main St., Woodstock, Ont.
- 7.\*A. M. MACKENZIE, B.A.Sc., C.E., Montreal, Que.  
*Engineering Dept., Bell Telephone Co.*
1. H. N. MACPHERSON, B.A.Sc., 2306 Rose St., Regina, Sask.
3. A. H. MACQUARIE, B.A.Sc., R.R. No. 1, Merlin, Ont.
7. J. A. MARSHALL, B.A.Sc., Ryckmans, Ont.
- 1.\*J. A. P. MARSHALL, B.A.Sc., C.E., 111 Ellsworth Ave., Toronto, Ont.  
*Dept. Public Highways.*
- 7.\*R. G. MATTHEWS, B.A.Sc., 174 Brant Ave., Brantford, Ont.
- 3.\*H. W. MAXWELL, B.A.Sc., 221 Wellington St., St. Mary's, Ont.  
*Geological Survey.*
- 1.\*R. C. McDONALD, B.A.Sc., Ottawa, Ont.  
*Geological Survey.*
1. S. B. MCGILL, B.A.Sc., 7459 Greenview Ave., Chicago
7. D. L. McLAREN, B.A.Sc., Peterborough, Ont.  
*With Canadian General Electric Co.*
2. P. W. MEAHAN, B.A.Sc., Bathurst Village, N.B.
- 1.\*F. C. MECHIN, B.A.Sc., Halifax, N.S.  
*Engineer, Imperial Oil Co.*
- 1.\*W. G. MILLAR, B.A.Sc., Toronto, Ont.  
*With Underwriters' Association.*
- 1.\*A. S. MILLER, B.A.Sc., Brighton, Ont.  
*Dominion Canners, Limited.*
- 6.\*W. E. MILLIGAN, B.A.Sc., Rancagua, Chili.  
*With Braden Copper Co.*
- 7.\*P. H. MILLS, B.A.Sc., Sun Life Bldg., Toronto, Ont.  
*Mills, Rayney & Dewar.*
- 1.\*J. S. MITCHELL, B.A.Sc., Toronto, Ont.  
*Provincial Highways Department.*
1. J. R. MONTAGUE, B.A.Sc., 211 McGill St., Montreal, Que.  
*c/o D. A. Loomis & Son.*
6. D. MORRISON, B.A.Sc., Bowmanville, Ont.  
*Goodyear Tire & Rubber Co.*
1. G. J. MULLINS, B.A.Sc., Toronto, Ont.  
*Harbour Commissioners.*
- 1.\*E. P. MUNTZ, B.A.Sc., Apt. 2, 258 Bay St., Hamilton, Ont.
- 7.\*C. L. NICHOLSON, B.A.Sc., 199 Concord Ave., Toronto, Ont.  
*Toronto Hydro-Electric System.*
- 1.\*J. B. NICHOLSON, B.A.Sc., Excelsior Life Building, Toronto, Ont.  
*J. B. Nicholson, Ltd., Engineers & Contractors.*
- 1.\*C. NOECKER, B.A.Sc., Waterloo, Ont.  
*Asst. Town Engineer.*
1. J. A. OWENS, B.A.Sc., Toronto, Ont.  
*Asst. Engineer, J. B. Nicholson, Ltd.*

\*Degree with honours.

## 1914—Continued

1. A. H. PARKER, B.A.Sc.,  
*Dept. of Roads.* Cornwall, Ont.
- 1.\*R. G. PATTERSON, B.A.Sc.,  
*c/o Roberts Bros.* 17 La Salle St., Chicago
- 7.\*L. D. PEART, B.A.Sc.,  
*Northern Electric Co. Ltd.* 102 Irvine Ave., Westmount, P.Q.
1. C. W. PENNINGTON, B.A.Sc.,  
*Valley City Heating Co.* Dundas, Ont.
- 1.\*C. V. PERRY, B.A.Sc. (Killed in action, 1917).
- 5.\*W. E. PHILLIPS, B.A.Sc.,  
*Frontenac Moulding & Glass Co.* Kingston, Ont.
7. G. O. PHILP, B.A.Sc.,  
*Supt. Ontario Power Co.* Niagara Falls, Ont.
1. P. H. RANEY, B.A.Sc. (Killed in action, Belgium, 1917).
1. R. H. RICE, B.A.Sc., 116 Erskine Ave., Toronto, Ont.
7. A. S. ROBERTSON, B.A.Sc.,  
*With Hydro-Electric Power Commission.* Niagara Falls, Ont.
- 4.\*J. M. ROBERTSON, B.A.Sc.,  
*With McGregor & McIntyre, Ltd.* Toronto, Ont.
7. H. D. ROTHWELL, B.A.Sc.,  
*Hydro-Electric Power Commission.* Toronto, Ont.
1. F. S. RUTHERFORD, B.A.Sc.,  
*Organizer of Tech. Educ., Dept. of Education.* Toronto, Ont.
- 3.\*J. G. SCOTT, B.A.Sc. (Died while on overseas service, 1918).
- 7.\*F. M. SERVOS, B.A.Sc., 261 5th Ave., Mais., Montreal, Que.
- 1.\*H. L. SHEPPARD, B.A.Sc., 12 Drayton Ave., Toronto, Ont.
1. N. E. D. SHEPPARD, B.A.Sc.,  
*Riordon Pulp and Paper Co.* Hawkesbury, Ont.
1. S. SHUPE, B.A.Sc.,  
*Town Engineer.* Oshawa, Ont.
6. A. W. SIME, B.A.Sc.,  
*A.D.C. Government House.* 212 Heath St. W., Toronto, Ont.
- 1.\*B. N. SIMPSON, B.A.Sc.,  
*With Hydro-Electric Power Commission* 190 University Ave., Toronto, Ont.
1. C. E. SINCLAIR, B.A.Sc.,  
*With Geo. H. Hees, Son & Co.* Toronto, Ont.
- 1.\*J. B. SKAITH, B.A.Sc., 111 Madison Ave., Toronto, Ont.
- 4.\*W. C. SKINNER, B.A.Sc., 1022 Cass Ave., Detroit, Mich.
1. H. M. SMITH, B.A.Sc. (deceased).
2. G. M. SMYTH, B.A.Sc., (deceased).
- 1.\*N. L. SOMERS, B.A.Sc.,  
*Coke Plant Engr., Algoma Steel Corp.* Sault Ste. Marie, Ont.
7. R. O. STANDING, B.A.Sc., Inglewood, Ont.
- 7.\*E. C. R. STONEMAN, B.A.Sc., 215 Albany Ave., Toronto, Ont.
1. I. R. STROME, B.A.Sc.,  
*Irrigation Engineer, Dept. of Interior.* Calgary, Alta.
3. S. G. TACKABERRY, B.A.Sc.,  
*Asst. Engineer of Equipment, Air Board.* Ottawa, Ont.
2. J. S. TAYLOR, B.A.Sc. (Killed in action, France, 1916).
- 1.\*C. N. TEMES, B.A.Sc., 808 College Street, Toronto, Ont.
- 3.\*E. H. TENNENT, B.A.Sc., 456 Ridout Street, London, Ont.

\*Degree with honours.

## 1914—Continued.

1. J. A. TILSTON, B.A.Sc., 9 Kew Baech Ave., Toronto, Ont.  
 1.\*G. E. TRELOAR, M.A.Sc., 670 Broadview Ave., Toronto, Ont.  
 7.\*W. S. TULL, B.A.Sc., Louisburg, N.S.  
*Marconi Wireless Telegraph Co.*  
 6. E. A. TWIDALE, B.A.Sc. (Killed in action, France, 1917).  
 1.\*F. T. VAN DYKE, B.A.Sc., New Brunswick, N.J.  
*Eastern Potash Corp.*  
 3.\*M. F. VERITY, B.A.Sc., Brantford, Ont.  
*Verity Plough Co.*  
 1.\*H. O. WADDELL, B.A.Sc., Port Hope, Ont.  
 1.\*H. W. WAGNER, B.A.Sc., Niagara Falls, Ont.  
*Hydro-Electric Power Commission.*  
 1.\*H. D. M. WALLACE, B.A.Sc. (Killed in action, 1917).  
 1. P. L. WHITLEY, B.A.Sc., Gorrie, Ont.  
 6.\*A. E. WIGLE, B.A.Sc., Nobel, Ont.  
*Canadian Explosives Limited.*  
 7.\*J. A. H. WIGLE, B.A.Sc., Kingsville, Ont.  
 4.\*A. C. WILSON, B.A.Sc., 283 Evelyn Ave., Toronto, Ont.  
*Demonstrator, Dept. of Architecture, University of Toronto.*  
 1. H. P. WILSON, B.A.Sc., Toronto, Ont.  
*Canadian Inspection Co.*  
 2.\*R. W. YOUNG, B.A.Sc., Timmins, Ont.  
*Mine Foreman, Hollinger Mines.*

## 1915

1. L. S. ADLARD, B.A.Sc., Punjab, India  
*Dis't Commissioner, British Gov't.*  
 1. A. C. ANDERSON, B.A.Sc., 242 Monarch Park Ave., Toronto, Ont.  
*City Architect's Department.*  
 1.\*G. A. ARKSEY, B.A.Sc., 270 N. Lisgar St., Toronto, Ont.  
 2. R. M. ARTHUR, B.A.Sc., Sudbury, Ont.  
 1. F. D. AUSTIN, B.A.Sc., Wales, Ont.  
*Asst. City Engineer.*  
 7. W. V. BALL, B.A.Sc., Montreal, Que.  
*L'Air Liquide Societée.*  
 7. T. R. BANBURY, B.A.Sc., Toronto, Ont.  
*Northern Aluminum Co.*  
 7. V. A. BEACOCK, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1.\*P. BENNETT, B.A.Sc., 705 Fifth Ave. W., Calgary, Alta.  
 7.\*H. M. BLACK, B.A.Sc., 252 Eglinton Ave., Toronto, Ont.  
*With Harley Kay Co.*  
 7. W. H. BONUS, B.A.Sc., Toronto, Ont.  
*Asst. Superintendent, University of Toronto.*  
 6.\*J. E. BREITHAUP, B.A.Sc., Kitchener, Ont.  
*With Breithaupt Leather Co.*  
 1.\*E. D. G. BROUSE, B.A.Sc., 73 St. George St., Toronto, Ont.  
*With Norman McLeod, Contractor.*  
 1.\*L. R. BROWN, B.A.Sc., Montreal, Que.  
*Construction Dept., Algoma Steel Co.*  
 1.\*F. M. BUCHANAN, B.A.Sc., Montreal, P.Q.  
*With Dominion Tar and Chemical Co.*  
 7. H. C. BUDD, B.A.Sc., Winnipeg, Man.  
*Canadian General Electric Co.*

\*Degree with honours.

## 1915—Continued.

4. H. J. BURDEN, B.A.Sc., 494 Avenue Road, Toronto, Ont.  
 1. F. N. D. CARMICHAEL, B.A.Sc., 213 Cottingham St., Toronto, Ont.  
 4.\*R. W. CATTO, B.A.Sc., 900 Pingree St., Detroit, Mich.  
 1. R. M. COCKBURN, B.A.Sc., 324 Spadina Road Hill, Toronto, Ont.  
*Cockburn & Bundy.*  
 1.\*J. D. COOK, B.A.Sc. (Killed in action, 1918).  
 1.\*A. B. CREALOCK, B.A.Sc., Toronto, Ont.  
*Dept. of Public Highways.*  
 1.\*W. R. DA COSTA, B.A.Sc., 471 Brunswick Ave., Toronto, Ont.  
 1. N. H. DANIEL, B.A.Sc., Oshawa, Ont.  
*General Motors.*  
 3.\*C. G. DAVEY, B.A.Sc., Flint, Mich.  
*Champion Ignition Co.*  
 7.\*G. P. DAVIDSON, B.A.Sc. (Killed in action, 1917).  
 4. J. J. DAVIDSON, B.A.Sc., Humber Bay, Ont.  
 7. W. A. DEAN, B.A.Sc., 561 Avenue Rd., Toronto, Ont.  
*Wm. Steele & Sons, Engineers.*  
 1.\*E. V. DEVERALL, B.A.Sc., Hamilton, Ont.  
*Hamilton Bridge Works.*  
 7.\*J. DIBBLEE, B.A.Sc., Toronto, Ont.  
*With Hydro-Electric Power Commission.*  
 1.\*W. L. DICKSON, B.A.Sc., 76 Pinewood Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1.\*G. A. DOWNEY, B.A.Sc., Orillia, Ont.  
 4. G. R. EDWARDS, B.A.Sc., 1263 King St. W., Toronto, Ont.  
*Edwards & Edwards, Architects.*  
 7.\*R. V. ELLIOTT, B.A.Sc., Toronto, Ont.  
*Northern Aluminum Co.*  
 2. E. R. EMMERSON, B.A.Sc., Court St. N., Port Arthur, Ont.  
 1. A. C. EVANS, B.A.Sc., 592 King St. W., Toronto, Ont.  
*Instructor, Soldiers' Aid Commission.*  
 1. H. S. FALCONER, B.A.Sc. (deceased).  
 7. D. T. FLANNERY, B.A.Sc., 190 University Ave., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 1. J. W. H. FORD, B.A.Sc., 121 Shearer St., Montreal, Que.  
 1.\*W. R. FRASER, B.A.Sc., Barrie, Ont.  
*With G. T. Ry.*  
 1. W. G. FRENCH, B.A.Sc., 109 Willis Ave. W., Detroit, Mich.  
*With Edison Co.*  
 1.\*W. J. FULTON, B.A.Sc., 606 Indian Rd., Toronto, Ont.  
*c/o G. S. Abrey, O.L.S.*  
 1. R. D. GALBRAITH, B.A.Sc., (deceased).  
 1. C. N. GEALE, B.A.Sc., 304 Rogers St., Peterborough, Ont.  
 6. L. G. GLASS, B.A.Sc., 603 Queen's Ave., London, Ont.  
 1. G. A. GOODERHAM, B.A.Sc. (deceased).  
 7.\*W. H. R. GOULD, B.A.Sc. (Killed in action, 1918).  
 4.\*T. S. GRAHAM, B.A.Sc., 139 Colbeck Ave., Toronto, Ont.  
*General Contractor.*  
 1.\*E. R. GRANGE, B.A.Sc., Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*  
 1. E. D. GRAY, B.A.Sc., Toronto, Ont.  
*Imperial Oil Co.*  
 7. G. D. GRAY, B.A.Sc., 17 Elm St., Welland, Ont.

\*Degree with honours.

## 1915—Continued.

1. G. S. GRAY,  
*With Kent Ockley, Limited.* Toronto
3. J. GRAY, B.A.Sc., 1135 Catherine St., Victoria, B.C.
7. G. E. GRIFFITHS, B.A.Sc., Niagara Falls, Ont.  
*Hydro-Electric Power Commission.*
2. M. S. HAAS, B.A.Sc., 128 St. George St., Toronto, Ont.
2. D. S. HALFORD, B.A.Sc., Detroit  
*Dodge Motor Car Co., Metallurgical Dept.*
- 2.\*W. T. HALL, B.A.Sc. (Killed in action, France, 1917). Arkell, Ont.
- 2.\*J. E. HANLON, B.A.Sc., Mimico, Ont.
1. C. HAYWARD, B.A.Sc.,  
*Town Engineer.*
- 2.\*L. T. HIGGINS, B.A.Sc., Rancagua, Chili.  
*Braden Copper Co.*
- 1.\*C. E. HOGARTH, B.A.Sc., 130 Herkimer St., Hamilton, Ont.
7. T. P. IRELAND, B.A.Sc., 119 Carrick Ave., Hamilton, Ont.  
*Hamilton Gas Company.*
- 7.\*G. A. IRONSIDE, B.A.Sc., Box 154, Iroquois Falls, Ont.
7. C. W. H. JACKSON, B.A.Sc., Windsor, Ont.  
*McEachern & Sons, Contractors.*
7. K. A. JEFFERSON, B.A.Sc., Arcola, Sask.
- 1.\*G. W. F. JOHNSON, B.A.Sc., Pittsburgh, Pa.  
*Pittsburgh Des Moines Steel Co.*
7. C. M. JONES, B.A.Sc., Toronto, Ont.  
*Jones & Moore.*
2. R. D. JONES, B.A.Sc., 300 Spadina Rd. Hill, Toronto, Ont.
1. E. H. JUPP, B.A.Sc., Ottawa, Ont.  
*With Grant Bros.*
7. C. R. KEYS, B.A.Sc., New York, N.Y.  
*Curtiss Aeroplane and Motor Corporation.*
- 5.\*H. KOHL, B.A.Sc., Ottawa, Ont.  
*Dept. of Mines.*
- 1.\*R. E. LAIDLAW, B.A.Sc., Toronto, Ont.  
*With McCarthy & McCarthy.*
- 1.\*G. J. LAMB, B.A.Sc., Port Arthur, Ont.  
*Asst. City Engineer.*
- 7.\*G. W. LAWRENCE, B.A.Sc., Toronto, Ont.  
*Sangamo Electric Co., Ltd.*
- 1.\*H. O. LEACH, B.A.Sc. (Killed in action, France, 1918). Wingham, Ont.
- 3.\*R. H. LLOYD, B.A.Sc., Wingham, Ont.
1. W. E. LOCKHART, B.A.Sc. (Killed in action, France, 1917).
- 1.\*W. E. LONGWORTHY, B.A.Sc., 2035 Hamilton St., Regina, Sask.
- 1.\*C. T. LOUNT, B.A.Sc., Suite 10, Huntley Apts., 88 Young St., Winnipeg, Man.  
*Imperial Oil Co.*
- 1.\*R. G. LYÉ, B.A.Sc., Owen Sound, Ont.  
*Hiram Walker & Sons, Metal Products.*
- 1.\*C. A. MACDONALD, B.A.Sc., Walkerville, Ont.  
*Bain, Bicknell, Macdonald & Gordon.*
2. I. M. MACDONELL, B.A.Sc., 35 Prince Arthur Ave., Toronto, Ont.  
*Macpherson, Bain, Bicknell, Macdonald & Gordon.*
- 1.\*H. E. MACPHERSON, B.A.Sc., St. Thomas, Ont.
- 1.\*W. R. McCAFFREY, B.A.Sc., 45 Albermarle Ave., Toronto, Ont.  
*National Fire Proofing Co. of Canada, Ltd.*

\* Degree with honours.

## 1915—Continued.

1.*C. R. McCORT, B.A.Sc., <i>Laurentide Paper Co.</i>	Grandmere, Que.
1.*J. P. McDONALD, B.A.Sc., <i>McDonald's Coal Office.</i>	Brantford, Ont.
1.*K. D. McDONALD, B.A.Sc., <i>Imperial Oil Co.</i>	Toronto, Ont.
3.*W. R. McGIE, B.A.Sc., <i>Ford Motors.</i>	Ford City, Ont.
1.*D. F. MCGUGAN, B.A.Sc., <i>Dominion Tar and Chemical Co.</i>	Toronto, Ont.
7. J. S. MCINTYRE, B.A.Sc., <i>With H.E.P.C.</i>	Toronto, Ont.
1. E. V. McKAGUE, B.A.Sc., <i>With Elliott &amp; Hume, Barristers.</i>	Kent Bldg., Toronto, Ont.
7. E. T. MARTIN, B.A.Sc., <i>Northern Electric Co.</i>	121 Shearer St., Montreal, Que.
1.*W. H. MEITZ, B.A.Sc., <i>Albert Albrecht Co.</i>	739 Manistique St., Detroit, Mich.
2. F. L. MILLS, B.A.Sc., <i>Dental College.</i>	2 Spadina Rd., Toronto, Ont.
1.*G. MITCHELL, B.A.Sc.,	42 Florence St., Hamilton, Ont.
1. J. T. MOGAN, B.A.Sc., <i>With John E. Russell Co.</i>	17 Dorval Rd., Toronto, Ont.
7.*E. M. MONTEITH, B.A.Sc., <i>Walworth Myg. Co.</i>	220 N. Desplaines St., Chicago, Ill.
4.*A. MORRIS, B.A.Sc.,	128 Park Road, Toronto, Ont.
1. B. M. MORRIS, B.A.Sc.	(Killed in action, France, 1917).
5.*W. D. MORRIS, B.A.Sc., <i>Gorman, Eckert Co.</i>	15 Bellevue Ave., London, Ont.
2. J. M. MUIR, B.A.Sc., <i>Dunlop Tire &amp; Rubber Goods Co.</i>	Toronto, Ont.
1.*M. A. NEILSON, B.A.Sc., <i>Inspector, W. H. Banfield &amp; Sons.</i>	Toronto, Ont.
1.*H. S. NICKLIN, B.A.Sc., <i>Asst. to City Engineer.</i>	Guelph, Ont.
1. E. B. O'CONNOR, B.A.Sc., <i>Atlas Tank Works.</i>	Toronto, Ont.
1. W. M. OMAND, B.A.Sc., <i>East Side Works.</i>	Armco, Middleton, Ohio.
1.*R. A. PAUL, B.A.Sc., <i>Hydro-Electric Power Commission.</i>	Toronto, Ont.
3.*A. N. PAYNE, B.A.Sc., <i>Mechanical Engineer, Willard's Chocolates, Ltd.</i>	Toronto, Ont.
1. L. P. PEARCE, B.A.Sc.,	Yorkton, Sask.
1.*H. M. PECK, B.A.Sc. (Died in France, 1918).	
1. S. M. PETERNIN, B.A.Sc., <i>C. A. Dunham &amp; Co., Heating Engineers.</i>	Toronto, Ont.
1.*C. F. PORTER, B.A.Sc., <i>Canadian Steel Corporation.</i>	Windsor, Ont.
1.*J. E. PORTER, B.A.Sc.,	591 Victoria Ave., Windsor, Ont.
2. W. D. POWELL, B.A.Sc., <i>Chief Engineer, Dominion Steel Products Co., Ltd.</i>	Brantford, Ont.
7. W. F. P. PURDY, B.A.Sc.,	812 Church St., Windsor, Ont.
1. W. E. RALEY, B.A.Sc. (Died of wounds received in action, 1916).	

\*Degree with honours.

## 1915—Continued.

1. C. C. RANCE, B.A.Sc.,  
*United Drug Co.* Toronto, Ont.
- 1.\*G. RANKIN, B.A.Sc.,  
*City Architect Dept.* Toronto, Ont.
1. W. B. REDMAN, B.A.Sc.,  
*Canadian National Rlys.* Toronto, Ont.
- 3.\*F. G. REID, B.A.Sc.,  
*Factory Manager, Harvey Rim and Wheel Co.* 721 Ashland Ave., Buffalo, N.Y.
5. P. J. RELYEA, B.A.Sc.,  
*Frodingham Iron & Steel Co.* Scunthorpe, England.
- 1.\*A. A. RICHARDSON, B.A.Sc.,  
*Dept. Soldiers' Civil Re-establishment.* Peterborough, Ont.
- 3.\*A. S. ROBERTSON, B.A.Sc., Walkerton, Ont.
1. J. T. ROSE, B.A.Sc.,  
*Highways Department.* Guelph, Ont.
- 7.\*A. C. ROSS, B.A.Sc.,  
*With Rolls-Royce Co.* Cleveland, Ohio.
2. J. ROSS, B.A.Sc., 405 Dundas St. West, Toronto, Ont.
- 1.\*H. M. ROWE, B.A.Sc., Norwich, Ont.
4. G. W. RUTTER, B.A.Sc.,  
*With York Knitting Mills.* 29 Castle Frank Rd., Toronto, Ont.
- 7.\*E. W. D. SAVAGE, B.A.Sc., 70 Irving Pl., New York, N.Y.
7. A. G. SCOTT, B.A.Sc.,  
*Chamber of Commerce.* Victoria, B.C.
- 1.\*E. H. SCOTT, B.A.Sc., 725 St. Clair Ave. W., Toronto, Ont.
- Imperial Oil Co.*
- 1.\*R. G. SCOTT, B.A.Sc., (deceased).
7. N. F. SEYMOUR, B.A.Sc.,  
*Hydro-Electric Power Commission.* Toronto, Ont.
- 1.\*J. H. SHAW, B.A.Sc., 651 Crawford St., Toronto, Ont.
1. J. S. SHEEHY, B.A.Sc.,  
*R. Sheehy & Sons.* Peterborough, Ont.
3. W. G. SHIER, B.A.Sc. (Died of wounds received in action, 1916).
- 1.\*C. N. SIMPSON, B.A.Sc., 326 Seaton St., Toronto, Ont.  
*Contractor.*
1. R. B. SINCLAIR, B.A.Sc. (Died of pneumonia in England while on over-seas service, 1919).
3. A. H. SMYTH, B.A.Sc., Strathroy, Ont.  
*Strathroy Furniture Co.*
- 7.\*W. A. STEEL, B.A.Sc., Ottawa, Ont.  
*Major, Canadian Signal Corps, Militia Headquarters.*
2. J. B. STITT, B.A.Sc., Rancagua, Chili.  
*Braden Copper Co.*
3. J. D. STONE, B.A.Sc., Toronto, Ont.  
*Campbell Flour Mills.*
- 7.\*G. C. STOREY, B.A.Sc., Toronto, Ont.  
*Davenport Works, Canadian Allis Chalmers.*
- 2.\*J. E. C. STROUD, B.A.Sc., Anyox, B.C.  
*With Granby Consol'd Mining and Smelting Co.*
- 7.\*A. N. SUHLER, B.A.Sc., Pt. Edward, Ont.
7. A. N. TAYLOR, B.A.Sc., Goderich, Ont.  
*Contractor.*
3. G. D. TILLSON, B.A.Sc., Tillsonburg, Ont.

\*Degree with honours.

## 1915—Continued.

1. L. B. TILLSON, B.A.Sc., 43 Wellington Ave., Windsor, Ont.  
*Canadian Steel Corp.*
1. J. A. TOM, B.A.Sc., Toronto, Ont.  
*Resident Highway Engineer, Provincial Dept. of Highways.*
- 5.\*W. UFFELMANN, B.A.Sc., Montreal, Que.  
*Canadian Consolidated Rubber Co.*
- 7.\*A. L. WARD, B.A.Sc., Niagara Falls, Ont.  
*Hydro-Electric Power Commission.*
- 1.\*F. E. WEIR, B.A.Sc., Stoney Creek, Ont.  
*Ontario Highways.*
- 1.\*C. W. WEST, B.A.Sc., Campbellford, Ont.
1. J. N. WILLIAMS, B.A.Sc. (deceased).
- 1.\*J. C. WILSON, B.A.Sc., Wingham, Ont.
- 1.\*H. A. WOOD, B.A.Sc., 2 Chicora Ave., Toronto, Ont.  
*Mail Order Dept., Robert Simpson Co.*

## 1916.

1. E. B. ALLAN, B.A.Sc., Hamilton, Ont.  
*c/o City Engineer.*
7. F. W. BALL, B.A.Sc., Toronto, Ont.  
*Instructor, Invalided Soldiers' Commission.*
1. L. F. BARNES, B.A.Sc., 115 Augusta St., Hamilton, Ont.
1. B. W. BEMROSE, B.A.Sc., Sault Ste. Marie, Ont.  
*With Lang & Ross.*
- 5.\*W. G. BIRRELL, B.A.Sc., Pinkerton, Ont.
- 8.\*D. BOYD, B.A.Sc., Kingston, Ont.  
*Dept. of Mining and Metallurgy, Queen's University.*
3. H. E. BREULS, B.A.Sc., 845 Bloor St. W., Toronto, Ont.  
*Willys Overland.*
- 5.\*N. B. BROWN, B.A.Sc., Toronto, Ont.
3. J. R. CHAPMAN, B.A.Sc. (killed in action, France, 1917).
- 7.\*K. N. CUMMING, B.A.Sc., Radio Station, Marian, Mass.  
*Radio Corporation of America.*
3. J. N. CUNNINGHAM, B.A.Sc. (killed in action, France, 1917).
1. R. S. DALE, B.A.Sc., Toronto, Ont.  
*Paterson Mfg. Co.*
- 7.\*L. G. DANDENO, B.A.Sc., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
3. J. L. DELISLE, B.A.Sc., Chicoutimi, Que.  
*With Chicoutimi Pulp Co.*
1. W. L. DOBBIN, B.A.Sc., 151 Indian Rd., Toronto, Ont.  
*With Grant Contracting Co.*
1. J. H. EASTWOOD, B.A.Sc., Matheson, Ont.  
*Morrow & Beatty, Ltd.*
7. R. L. FLEGG, B.A.Sc., Montreal, Que.  
*Northern Electric Co. Sales Eng.*
1. D. B. GARDNER, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*
- 7.\*E. G. GURNETT, B.A.Sc., 190 University Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
- 1.\*M. GUROFSKY, B.A.Sc., Box 550, Timmins, Ont.
1. G. C. HAGEDORN, B.A.Sc., 194 Frederick St., Kitchener, Ont.
1. R. M. HARE, B.A.Sc., 247 Brunswick Ave., Toronto, Ont.

\*Degree with honours.

## 1916—Continued.

1. L. W. HARRON, B.A.Sc., 869 Bathurst St., Toronto, Ont.  
*Harrons Dye Works.*
1. C. E. HASTINGS, B.A.Sc., 252 Russell Hill Road, Toronto, Ont.  
*Demonstrator in Drawing, University of Toronto.*
4. R. T. C. HOIDGE, B.A.Sc., 560 Dupont Street, Toronto, Ont.
7. S. HUBERT, B.A.Sc., Montreal, Que.  
*Engineering Dept. Canadian Explosives, Ltd.*
1. K. B. JACKSON, B.A.Sc., Toronto, Ont.  
*Instr. in Eng., Physics and Photography, University of Toronto.*
- 7.\*H. C. KARN, B.A.Sc., Montreal, Que.  
*Canadian Explosives Limited.*  
*Hydro-Electric Power Commission.*
7. G. F. KING, B.A.Sc., Simcoe, Ont.
1. J. R. KIRBY, B.A.Sc. (Accidentally killed while on active service, England, 1918).
1. R. W. KIRBY, B.A.Sc., 539 Yonge St., Toronto, Ont.  
*With R. G. Kirby.*
3. E. W. KIRN, B.A.Sc., 112 E. Kilbuck St., Tecumseh, Mich.
5. S. J. KRUG, B.A.Sc., Montreal, Que.  
*Consolidated Rubber Co.*
1. L. A. C. LEE, B.A.Sc., Toronto, Ont.  
*City Architects' Dept.*
- 2.\*B. A. McCRODAN, B.A.Sc., Globe, Ariz.
3. R. A. MACDONALD, B.A.Sc., 180 Elizabeth St., Stratford, Ont.  
*Asst. Manager, MacDonald Thresher Co.*
- 1.\*O. MARGISON, B.A.Sc., 62 College St., Toronto, Ont.
- 1.\*W. B. MITCHELL, B.A.Sc., 150 Wharncliffe Rd., London, Ont.  
*Mitchell & Mohan.*
- 1.\*C. H. NEY, B.A.Sc., Ottawa, Ont.  
*Geodetic Survey, Dept. of the Interior.*
3. J. C. NEWCOMBE, B.A.Sc. (Killed in action, France, 1918).
7. G. E. NOTT, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*With Hydro-Electric Power Commission.*
1. E. A. O'CALLAGHAN, B.A.Sc., Timmins, Ont.  
*Surveyor, Hollinger Mines.*
- 6.\*C. E. OLIVER, B.A.Sc., 1837 Fern St., Victoria, B.C.  
*Canadian Consolidated Smelting Co.*
1. N. L. POWELL, B.A.Sc., Delhi, Ont.
1. J. E. PRINGLE, B.A.Sc., Temiskaming, Que.  
*Construction Dept., Riordon Co., Ltd.*  
*Engineer on Construction, Kipawa Co. Ltd.*
7. J. RICHMOND, B.A.Sc., Montreal, Que.  
*Northern Electric Co.*
1. H. C. ROSE, B.A.Sc., Guelph, Ont.  
*Provincial Highways Dept.*
- 1.\*S. R. ROSS, B.A.Sc., Hamilton, Ont.  
*Frid Construction Co.*
7. S. W. ROSS, B.A.Sc., 1996 Morris Ave., Bronx, N.Y.  
*c/o J. B. Kass.*
- 3.\*J. P. RUSSELL, B.A.Sc., 27 Whitney Ave., Toronto, Ont.
1. W. B. SCOTT, B.A.Sc., 764 Logan Ave., Toronto, Ont.
- 1.\*R. L. SEABORNE, B.A.Sc., Box 174, Quebec, Que.  
*Manager, Laurentian Forest Production Ass'n.*

\*Degree with honours.

## 1916—Continued.

1.*R. L. SIEVEWRIGHT, B.A.Sc.,	304 Hogarth Ave., Detroit, Mich.
4. J. L. SKINNER, B.A.Sc.,	1022 Cass Ave., Detroit, Mich.
7. W. A. SMELSER, B.A.Sc.,	B.C. University, Vancouver, B.C.
7. C. A. SMITH, B.A.Sc.,	Timmins, Ont.
<i>Hollinger Consolidated Gold Mines.</i>	
1. W. H. STARK, B.A.Sc.,	Toronto, Ont.
<i>Dunlop Tire &amp; Rubber Goods Co.</i>	
1.*J. A. SUREDA, B.A.Sc.,	Utuado, Porto Rico.
1. J. E. TREMAYNE, B.A.Sc.,	Toronto, Ont.
<i>Toronto &amp; York Radial Railway Co.</i>	
5.*F. W. WARD, B.A.Sc.,	Cambridge, Mass.
<i>Harvard University.</i>	
1.*R. C. WARD, B.A.Sc.,	677 Huron St., Toronto, Ont.
7. A. R. WELLS, B.A.Sc.,	8 Strachan Ave., Toronto, Ont.
<i>With Hydro-Electric Power Commission.</i>	
7.*H. S. WEPPLER, B.A.Sc.,	Toronto, Ont.
<i>With Hydro-Electric Power Commission.</i>	
7. A. E. WIDDICOMBE, B.A.Sc. (deceased).	

## 1917.

1.*H. A. BABCOCK, B.A.Sc.,	Chatham, Ont.
<i>Canadian Des Moines Field Co.</i>	
4. J. BANIGAN, B.A.Sc.,	Toronto, Ont.
<i>Banigan, Armstrong &amp; Thompson.</i>	
1.*A. E. BERRY, B.A.Sc.,	Toronto, Ont.
<i>Provincial Board of Health, Exp. Station.</i>	
1.*R. S. C. BOTHWELL, B.A.Sc.,	87 Carlton St., Toronto, Ont.
7. H. S. BROWN, B.A.Sc.,	Toronto, Ont.
<i>Demonstrator in Electrical Engineering.</i>	
7. S. W. BUMSTEAD, B.A.Sc.,	St. Louis, Mo.
<i>Century Electric Co.</i>	
1.*F. C. CHRISTIE, B.A.Sc.,	Yorkton, Sask.
<i>With H. K. Moberley, D.L.S.</i>	
7. J. C. COLLERAN, B.A.Sc.,	280 Park St., Port Arthur, Ont.
1. E. H. CORMAN, B.A.Sc.,	R.R. No. 5, Hamilton, Ont.
5.*J. V. DICKSON, B.A.Sc.,	215 W. 109th St., New York, N.Y.
1. J. A. FRASER, B.A.Sc.,	Windsor, Ont.
<i>Canadian Conduit Co.</i>	
7. J. I. GRAM, B.A.Sc.,	Niagara Falls, Ont.
<i>Ontario Power Co.</i>	
1. W. K. GREATREX, B.A.Sc.,	85 Atlas Ave., Toronto, Ont.
2. G. HANMER, B.A.Sc.,	Ralph, Sask.
3. A. B. HARRIS, B.A.Sc.,	994 Danforth Ave., Toronto, Ont.
1. R. W. HARRIS, B.A.Sc.,	Toronto, Ont.
<i>Toronto Transportation Commission.</i>	
5. A. J. HOLDEN, B.A.Sc.,	Toronto, Ont.
<i>Chemist, Wm. Neilson, Ltd.</i>	
1.*R. W. HURLBURT, B.A.Sc.,	Toronto, Ont.
<i>Canadian Inspection &amp; Testing Laboratories, Ltd.</i>	
7. G. F. HUTCHESON, B.A.Sc.,	Huntsville, Ont.
<i>Muskoka Wood Mfg. Co.</i>	
7. L. LEVESQUE, B.A.Sc. (deceased).	
3. S. G. McCANDLISH, B.A.Sc.,	21 Smith Ave., Hamilton, Ont.
2.*H. L. MCCLELLAND, B.A.Sc.,	Cooksville, Ont.

\*Degree with honours.

1917—Continued.

- |       |  |   |
|-------|--|---|
| 3.    | P. E. McILHARGEY, B.A.Sc.,<br><i>Lincoln Electric Co.</i>  | Toronto, Ont.                           |
| 5.    | G. G. MACDONALD, B.A.Sc.,<br><i>Demonstrator in Chemical Engineering and Applied Chemistry,<br/>University of Toronto.</i> | Toronto, Ont.                           |
| 1.*R. | C. MANNING, B.A.Sc.,<br><i>With C. H. &amp; P. H. Mitchell.</i>  | 203 Hunter St. W., Hamilton, Ont.       |
| 3.*A. | S. MATHERS, B.A.Sc.,<br><i>With M. A. Kennedy &amp; Co.</i>  | 156 Arlington Ave., Toronto, Ont.       |
| 1.    | J. E. O'BRIEN, B.A.Sc.,<br><i>With M. A. Kennedy &amp; Co.</i>   | Toronto, Ont.                           |
| 7.*W. | A. R. OFFERHAUS, B.A.Sc.,<br><i>H.E.P.C.</i>   | Niagara Falls, Ont.                     |
| 1.    | H. A. PARR, B.A.Sc.,<br><i>Post Graduate Work, Massachusetts Institute of Technology.</i>                                  | Boston, Mass.                           |
| 1.*R. | D. RATZ, B.A.Sc.,<br><i>Canadian Consolidated Rubber Co.</i>   | Montreal, Que.                          |
| 1.    | E. E. SMITH, B.A.Sc.,  | Steelton, Ont.                          |
| 7.    | E. W. SMITHSON, B.A.Sc.,<br><i>Sales Engineer, General Electric Co.</i>  | 259 West Brighton Ave., Syracuse, N.Y.  |
| 3.*A. | M. SNIDER, B.A.Sc.,<br><i>Can. Ingersoll Rand Co.</i>  | Sherbrooke, Que.                        |
| 1.    | R. M. SPEIRS, B.A.Sc.,<br><i>With Bell Telephone Co.</i>   | Toronto, Ont.                           |
| 3.    | A. W. SWAN, B.A.Sc.,<br><i>Asst. Secretary, Engineering Institute of Canada.</i>   | Montreal, Que.                          |
| 1.    | A. P. THOMSON, B.A.Sc.,  | Toronto, Ont.                           |
| 1.*C. | E. TILSTON, B.A.Sc.,   | 112 Marchmont Rd., Toronto, Ont.        |
| 7.    | O. W. TITUS, B.A.Sc.,<br><i>Standard Underground Cable Co.</i>   | Hamilton, Ont.                          |
| 2.    | B. C. TOMLINSON, B.A.Sc.,<br><i>Br. American Nickel Corp.</i>  | Nickelton, Ont.                         |
| 1.*V. | TOPPING, B.A.Sc.,  | 11119 61st St., Edmonton, Alta.         |
| 7.*A. | A. TUFFORD, B.A.Sc.,<br><i>Salesman, Northern Electric Co.</i>   | Vancouver, B.C.                         |
| 7.    | H. A. TUTTLE, B.A.Sc.,<br><i>Demonstrator in Thermodynamics, University of Toronto.</i>                                    | Toronto, Ont.                           |
| 5     | E. J. TYRRELL, B.A.Sc.,<br><i>Research Chemist, T. Eaton Co.</i>   | Toronto, Ont                            |
| 4.*H. | R. WATSON, B.A.Sc.,<br><i>Architect.</i>   | 907 Excelsior Life Bldg., Toronto, Ont. |
| 1.    | G. WOOD, B.A.Sc.,<br><i>With Dominion Government.</i>  | 250 Cooper St., Ottawa, Ont.            |

1918

- 6.\*C. C. ANDERSON, B.A.Sc., 727 Victoria Ave., Windsor, Ont.  
 7. J. G. BALLINGER, B.A.Sc., Toronto, Ont.  
*Hydro-Electric Power Commission.*  
 7.\*C. K. DUFF, B.A.Sc., Toronto, Ont.  
*Research Assistant, School of Engineering Research, U. of T.*  
 1. F. D. ELLIS, B.A.Sc., 55 Lee Ave., Toronto, Ont.  
*Sarnia Bridge Co., Ltd.*  
 1. H. W. J. FAIRCLOUGH, B.A.Sc., 214 George St., Hamilton, Ont.

\*Degree with honours

## 1918—Continued.

7. R. A. FRASER, B.S.Ac., 83 Craig St., W., Montreal, Que.  
*Sangamo Electric Co.*
1. C. E. GAGE, B.A. Sc., Brunswick Ave., Toronto, Ont.
6. C. W. HANCOCK, B.A.Sc., Kitchener, Ont.  
*Salts & Potash Co. of Canada.*
7. B. HYMAN, B.A.Sc., 182 Baldwin Street, Toronto, Ont.
7. F. E. JOHNSTON, B.A.Sc., Sherbrooke, Que.  
*Canadian Ingersoll Rand Co.*
- 1.\*N. G. McDONALD, B.A.Sc., Toronto, Ont.  
*Demonstrator in Hydraulics, University of Toronto.*
- 7.\*E. W. MCLEOD, B.A.Sc., 8 Strachan Ave., Toronto, Ont.  
*Hydro Electric Power Commission*
2. C. E. MACDONALD, B.A.Sc., Toronto, Ont.  
*International Nickel Co. of Canada, Ltd.*
1. C. O. MADDOCK, B.A.Sc., Toronto, Ont.
1. A. R. MENDIZABAL, B.A.Sc., Toronto, Ont.  
*Demonstrator Drawing, University of Toronto.*
1. R. C. MITCHELL, B.A.Sc., 210 Major St., Toronto, Ont.
- 7.\*W. H. ORR, B.A.Sc., Toronto, Ont.  
*Demonstrator in Electrical Engineering, University of Toronto.*
1. G. P. PEARSON, B.A.Sc., Winnipeg, Man.  
*231 Chambers of Commerce, Dom. Water Power Branch.*
- 1.\*J. ROVSKY, B.A.Sc., 5407 Union Ave., S. Tacoma, Wash.
1. W. L. SAGAR, B.A.Sc., Toronto, Ont.  
*Demonstrator in Applied Mechanics, University of Toronto.*
- 1.\*M. SAMUEL, B.A.Sc., 7 Bellevue Place, Toronto, Ont.
- 1.\*C. R. SCOTT, B.A.Sc., 150 2nd Ave. East, N. Bay, Ont.
2. J. G. SHEPLEY, B.A.Sc., (Died while on active service, England, 1918).
- 7.\*W. G. WOONTON, B.A.Sc., London, Ont.  
*McCormick Mfg. Co., Ltd.*

## 1919

7. W. D. BROWN, B.A.Sc., Peterborough, Ont.  
*Canadian General Electric Co.*
- 1.\*W. J. BROWNE, B.A.Sc., Merton College, Oxford, England.  
*Rhodes Scholar.*
1. H. J. CALDWELL, B.A.Sc., 148 Beatrice St., Toronto, Ont.
3. T. W. CAMPBELL, B.A.Sc., Toronto, Ont.  
*Sales Dept., C. A. Dunham Co.*
5. J. E. CLARK, B.A.Sc., Toronto, Ont.  
*Demonstrator in Analytical Chemistry, University of Toronto.*
6. A. R. CLARRY, B.A.Sc., Toronto, Ont.  
*Travellers' Insurance Co.*
1. E. C. COWAN, B.A.Sc., 707 McMillan Ave., Ft. Rouge, Winnipeg,  
[Man.]
1. H. L. DOWLING, B.A.Sc., Detroit, Mich.  
*With Solway Process Co.*
7. R. A. DURAND, B.A.Sc., Toronto, Ont.  
*With Ford Motor Co. of Canada.*
1. C. W. EDMONDS, B.A.Sc., Simcoe, Ont.
6. J. H. FORMAN, B.A.Sc., Grimsby, Ont.
- 7.\*J. M. HARKINS, B.A.Sc., Toronto, Ont.  
*With Dunlop Tire & Rubber Goods Co.*

\*Degree with honours.

## 1919—Continued.

- 7.\*J. E. HESS, B.A.Sc.,  
*With Canadian General Electric Co.* Peterborough, Ont.
1. G. H. HOPPER, B.A.Sc.,  
*Hydro-Electric Power Commission.* Niagara Falls, Ont.
1. S. H. JOHNSTON, B.A.Sc.,  
*Harkness, Loudon & Hertzberg.* Toronto, Ont.
- 1.\*N. KEARNS, B.A.Sc.,  
*With Sao Paulo Light & Power Company.* Sarocaba, Brazil, S.A.
3. L. J. LESPRÉANCE, B.A.Sc.,  
*Diamond Power Specialty Co.* Detroit, Mich.
1. F. J. MATTHEWS, B.A.Sc.,  
*With H. H. Robertson Co., Ltd.* Kent Building, Toronto, Ont.
- 3.\*W. A. MOLLARD, B.A.Sc.,  
*With John M. Lyle.* 46 Albany Ave., Toronto, Ont.
1. W. B. MACINTYRE, B.A.Sc.,  
*With Willys-Overland, Ltd.* Toronto, Ont.
- 1.\*N. MACNICOL, B.A.Sc.,  
*G.T.R. Western Lines.* 542 Janette Ave., Windsor, Ont.
1. J. R. MCCOLL, B.A.Sc.,  
*With Dwight P. Robinson & Co., Inc. Engineers & Constructors.* 125 East 46th St., New York, N.Y.
1. H. B. NORWICH, B.A.Sc., 74 Sorauren Ave., Toronto, Ont.
3. R. T. PARK, B.A.Sc.,  
*Canadian Siroco Co. Ltd.* Windsor, Ont.
3. W. B. PATERSON, B.A.Sc.,  
*Canadian Siroco Co.* King St. W., Toronto, Ont.
7. W. M. REID, B.A.Sc., Vinemount, Ont.
- 7.\*H. ROSE, B.A.Sc.,  
*With Canadian General Electric Co.* Peterborough, Ont.
1. G. B. SNOW, B.A.Sc., Chibougamau, Que.  
*With Quebec and Chibougamau Railway.*
1. D. K. C. STRATHEARN, B.A.Sc., Morrisburg, Ont.  
*With Hydro-Electric Power Commission.*
6. A. A. SWINNERTON, B.A.Sc., Ottawa, Ont.  
*Department of Mines.*
7. A. L. TENNYSON, B.A.Sc., Toronto, Ont.  
*Demonstrator in Electrical Engineering, University of Toronto.*
7. A. M. THOMAS, B.A.Sc., Toronto, Ont.  
*Research Assistant, School of Engineering Research, University of Toronto.*

## 1920

1. C. G. R. ARMSTRONG, B.A.Sc., Amherstburg, Ont.  
*Bunner Mond Co.*
1. O. V. BALL, B.A.Sc., 177 Dowling Ave., Toronto, Ont.
7. R. A. BARBOUR, B.A.Sc., Toronto, Ont.  
*With Northern Electric Co.*
1. G. C. BENNETT, B.A.Sc., Sault Ste. Marie, Ont.  
*Lang & Ross*
1. E. BIRDSALL, B. A. Sc., 22 Hewitt Ave., Toronto, Ont.
7. F. W. BOOTH, B.A.Sc., Schenectady, N.Y.  
*With General Electric Company.*

\* Degree with honours.

1920—Continued.

- 1.\*G. A. H. BURN, B.A.Sc.,  
*Sanitary & Highways Dep't., Parliament Bldgs.* Toronto, Ont.
7. C. E. BURTON, B.A.Sc., Warwick, Ont.
1. E. L. CAVANA, B.A.Sc., Orillia, Ont.
- 3.\*M. H. CENTNER, B.A.Sc., 308 Indian Road, Toronto, Ont.
- 3.\*J. L. CHAMBERS, B.A.Sc., Jun. S.A.E., Walkerville, Ont.  
*Eng. Dept., Can. Products Ltd. Div. of General Motors of Canada.*
- 7.\*S. K. CHENEY, B.A.Sc., Toronto, Ont.  
*Demonstrator in Electrical Engineering, University of Toronto.*
6. H. B. CODY, B.A.Sc., Hamilton, Ont.  
*With Procter & Gamble.*
- 1.\*H. F. COON, B.A.Sc., 88 Grant Avenue, Hamilton, Ont.
- 5.\*H. E. CORMAN, B.A.Sc., Toronto, Ont.  
*With Gunns, Limited.*
1. E. CROSBY, B.A.Sc., 262 Shannon St., Toronto, Ont.
1. R. A. CRYSLER, B.A.Sc., Niagara Falls, Ont.  
*Assistant Engineer, Hydro-Electric Power Commission.*
1. E. R. DAFOE, B.A.Sc., Windsor, Ont.  
*John V. Gray Construction Co.*
- 1.\*W. P. DALE, B.A.Sc., Niagara Falls, Ont.  
*H.E.P.C.*
- 7.\*W. A. DANCEY, B.A.Sc., Toronto, Ont.  
*Demonstrator in Electrical Engineering, University of Toronto.*
- 7.\*T. A. DANIEL, B.A.Sc., Ingersoll, Ont.
6. A. H. DINGMAN, B.A.Sc., 376 Spadina Road, Toronto
1. E. B. DUSTAN, B.A.Sc., Walkerville, Ont.  
*Canadian Bridge Co.*
6. J. FAILL, B.A.Sc., Kitchener, Ont.  
*Chemist, Dominion Rubber Co.*
7. C. FORSTER, B.A.Sc., Kingsville, Ont.
2. E. R. GILLEY, B.A.Sc., 115 Eighth St., New Westminster, B.C.  
*With Gilley Brothers, Limited.*
2. C. W. GRAHAM, B.A.Sc., 10839—84th Avenue, Edmonton, Alta.
- 5.\*A. HAMBLETON, B.A.Sc., 189 St. Clarens Ave., Toronto, Ont.
7. R. C. HARDIE, B.A.Sc., Toronto, Ont.  
*Demonstrator in Thermodynamics, University of Toronto.*
1. W. HARMAN, B.A.Sc., Allandale, Ont.  
*Engineering Dept., Canadian National Rlys.*
- 1.\*R. HARRISON, B.A.Sc., Birchcliffe, Ont.
3. M. G. HENDERSON, B.A.Sc., R. R. No. 5, Tara, Ont.
4. Miss E. M. HILL, B.A.Sc., 11034—83rd Ave., Edmonton, Alta.
7. C. R. HILL, B.A.Sc., Toronto, Ont.  
*Research Assistant, University of Toronto.*
- 3.\*U. C. HOLLAND, B.A.Sc., Toronto, Ont.  
*Demonstrator in Mechanical Engineering, University of Toronto.*
- 7.\*R. D. HUESTIS, B.A.Sc., Toronto, Ont.  
*Demonstrator in Electrical Engineering, University of Toronto.*
- 1.\*C. A. HUGHES, B.A.Sc., Toronto, Ont.  
*Demonstrator in Applied Mechanics, University of Toronto.*
- 8.\*O. H. HUGILL, B.A.Sc., Sault Ste. Marie, Ont.
- 1.\*W. H. HUNTER, B.A.Sc., 628 Huron Street, Toronto, Ont.
- 4.\*L. B. HUSBAND, B.A.Sc., 33 Jackson St. W., Hamilton, Ont.
- 7.\*N. H. ILLMAN, B.A.Sc., Chatham, Ont.

\*Degree with Honours.

## 1920—Continued.

- 1.\*W. F. IRVIN, B.A.Sc., 196 High Park Ave., Toronto, Ont.  
*Toronto Transportation Commission*
1. E. W. JOHNSTON, B.A.Sc., Harriston, Ont.
- 1.\*F. T. JULIAN, B.A.Sc., Malton, Ont.
7. J. KELLEHER, B.A.Sc., Toronto, Ont.  
*Demonstrator in Electrochemistry, University of Toronto.*
- 6.\*H. C. KERMAN, B.A.Sc., Montreal, Que.  
*Standard Chemical Co.*
- 4.\*W. S. KIDD, B.A.Sc., Burritt's Rapids, Ont.
7. H. B. Little, B.A.Sc., Toronto, Ont.  
*Toronto Hydro-Electric System.*
3. H. J. MCCREERY, B.A.Sc., Toronto, Ont.  
*H.E.P.C.*
1. K. J. MCEACHERN, B.A.Sc., Alvinston, Ont.
7. C. J. McNAMARA, B.A.Sc., Port Colborne, Ont.
3. G. L. MACPHERSON, B.A.Sc., 81 Kendal Ave., Toronto Ont.
7. T. R. MANNING, B.A.Sc., 59 Wellington St. W., Toronto, Ont.
3. F. S. MERRY, B.A.Sc., 93 Moira Ave., Belleville, Ont.
7. M. H. MITCHELL, B.A.Sc., Montreal, Que.  
*Canadian Fire Underwriters Ass'n.*
- 1.\*E. L. MOOREHOUSE, B.A.Sc., 398 Helen Ave., Detroit, Mich.
- 5.\*J. E. T. MUSGRAVE, B.A.Sc., Longford, Ont.  
*Standard Chemical Company.*
- 7.\*W. J. NICHOL, B.A.Sc., Dunnville, Ont.
3. J. G. O'FLAHERTY, B.A.Sc., 35 Hayman Court, London, Ont.
- 7.\*J. S. PANTER, B.A.Sc., 61 Octavia St., Belleville, Ont.
1. E. L. PATERSON, B.A.Sc., Owen Sound, Ont.  
*With City Engineer.*
7. E. PULLAN, B.A.Sc., 80 D'Arcy Street, Toronto, Ont.
7. H. R. REED, 2348 Yonge St., N. Toronto, Ont.
2. C. A. RICHARDSON, B.A.Sc., Toronto, Ont.  
*With International Nickel Co.*
1. W. H. RIEHL, B.A.Sc., Stratford, Ont.  
*Ass't. Engineer's Office, Canadian National Railway.*
1. W. W. RITCHIE, B.A.Sc., Vancouver, B.C.
1. T. J. L. RYAN, B.A.Sc., 6 Albion Street, Brantford, Ont.
1. E. A. SALISBURY, B.A.Sc., 17 Bowden Ave., Toronto, Ont.
- 1.\*L. R. SHOEBOTTOM, B.A.Sc., Toronto, Ont.  
*With H. H. Robertson, Builders' Supplies.*
1. C. SMYTHE, B.A.Sc., 345 Runnymede Rd., Toronto, Ont.
6. H. C. SOEHNER, B.A.Sc., Toronto, Ont.  
*Demonstrator in Applied Chemistry, University of Toronto.*
1. G. E. STEPHENSON, B.A.Sc., Varna, Ont.
- 7.\*A. L. STEWART, B.A.Sc., Toronto, Ont.  
*Demonstrator in Thermodynamics, University of Toronto.*
1. D. H. STORMS, B.A.Sc., 53 Bay St. So., Hamilton, Ont.
- 7.\*A. G. TURNBULL, B.A.Sc., R.R. No. 3, Galt, Ont.
1. D. G. URE, B.A.Sc., 126 Forsyth St., Sarnia, Ont.
3. O. D. VAUGHAN, B.A.Sc., 66 Dunvegan Rd., Toronto, Ont.  
*With T. Eaton Co.*
- 1.\*G. E. WAIT, B.A.Sc., 169 Clemow Ave., Ottawa, Ont.
3. H. A. WASHINGTON, B.A.Sc., 663 Euclid Ave., Toronto, Ont.
4. D. M. WATERS, B.A.Sc., 60 Hampton Court Apts., Avenue Rd., Toronto, Ont.

\* Degree with honours.

1920—Continued.

3.*J. M. WATSON, B.A.Sc.,	104 Riddell St., Woodstock, Ont.
5. L. T. WATSON, B.A.Sc.,	Montreal, Que.
<i>Consolidated Rubber Co.</i>	
3. J. J. WEICHER, B.A.Sc.,	Toronto, Ont.
<i>Demonstrator in Mechanical Engineering, University of Toronto.</i>	
3.*M. L. WEIR, B.A.Sc.,	Y.M.C.A., Buffalo, N.Y.
<i>Lackawanna Steel Co.</i>	
1.*A. B. WHALEY, B.A.Sc.,	52 Roxborough Drive, Toronto, Ont.
2. W. S. WILCOCK, B.A.Sc.,	Flesherton, Ont.
1.*L. E. WILLMOTT, B.A.Sc.,	74 Crescent Rd., Toronto, Ont.
3. J. S. WILSON, B.A.Sc.,	Osaqua, Ont. (Via Ignace)
3.*L. L. YOUELL, B.A.Sc.,	Sherbrooke, Que.
<i>Canadian Ingersoll Rand Co.</i>	
7.*H. G. YOUNG, B.A.Sc.,	Agincourt, Ont.

## CERTIFICATES.

## MINERALOGY AND ASSAYING.

1896. G. JOHNSTON.  
 1897. E. B. WEBSTER.  
 1901. G. A. HUNT.

## ELECTRICITY.

1896. A. T. TYE, c/o Empresa Hanseatica, Barranquilla, Columbia, South America.  
 1898. A. N. McMILLAN, Penetanguishene, Ont.  
 1900. A. H. SMITH.  
 1896. E. I. SIFTON, London, Ont.  
     *Manager, London Electric Construction Co.*  
 1903. W. ELWELL (deceased).

---

\*Degree with Honours.

## INDEX TO GRADUATES.

In the following alphabetical list of the Graduates is given the year of graduation of each student. In the preceding list, which is arranged by classes in the order of graduation, may be found additional information as to occupation, addresses, etc.

## A

Abendana, E. M. (deceased) . . . . .	1914	Anderson, F. J. (deceased) . . . . .	1907
Acres, H. G. . . . .	1903	Anderson, R. M. . . . .	1908
Adams, J. H. . . . .	1910	Andrews, E. . . . .	1897
Adams, O. F. . . . .	1910	Andrews, F. C. (deceased) . . . . .	1914
Adlard, L. S. . . . .	1915	Angus, H. H. . . . .	1903
Adsett, F. C. . . . .	1914	Angus, R. W. . . . .	1894
Agnew, N. J. . . . .	1910	Apsey, J. F. . . . .	1888
Aitken, J. . . . .	1911	Archer, E. G. . . . .	1911
Akers, H. G. (deceased) . . . . .	1908	Ardagh, A. G. . . . .	1893
Alexander, J. H. . . . .	1904	Ardagh, E. G. R. . . . .	1900
Alison, T. H. . . . .	1892	Arens, A. H. . . . .	1906
Alison, J. G. R. . . . .	1903	Arens, H. W. (deceased) . . . . .	1905
Allan, E. B. . . . .	1916	Arens, R. J. . . . .	1908
Allan, J. R. . . . .	1892	Arens, E. G. . . . .	1909
Allan, J. L. . . . .	1900	Arksey, G. A. . . . .	1915
Allan, L. F. . . . .	1908	Armer, C. E. . . . .	1914
Allan, L. B. . . . .	1911	Armer, J. C. . . . .	1906
Allen, F. G. . . . .	1907	Armour, R. H. . . . .	1905
Allen, R. J. . . . .	1913	Armstrong, C. G. R. . . . .	1920
Allison, C. B. . . . .	1908	Armstrong, J. . . . .	1895
Alport, F. . . . .	1906	Armstrong, H. V. . . . .	1909
Alton, J. L. . . . .	1914	Arthur, R. M. . . . .	1915
Amos, W. L. . . . .	1906	Ashbridge, W. T. . . . .	1888
Amsden, W. G. (deceased) . . . . .	1910	Augustine, A. P. . . . .	1907
Anderson, A. C. . . . .	1915	Austin, E. T. . . . .	1909
Anderson, A. G. . . . .	1892	Austin, F. D. . . . .	1915
Anderson, A. S. (deceased) . . . . .	1913	Avery, C. R. . . . .	1913
Anderson, C. C. . . . .	1918	Aylesworth, C. B. . . . .	1905

## B

Babcock, H. A. . . . .	1917	Barber, F. . . . .	1906
Badgley, L. A. . . . .	1911	Barber, H. C. . . . .	1908
Bain, J. A. (deceased) . . . . .	1900	Barber, H. G. . . . .	1902
Bain, J. W. . . . .	1896	Barber, T. . . . .	1899
Baird, J. A. . . . .	1910	Barber, W. . . . .	1905
Baird, W. J. . . . .	1910	Barbour, R. A. . . . .	1920
Baker, M. H. . . . .	1906	Barker, H. F. . . . .	1894
Baldwin, F. W. . . . .	1906	Barley, J. H. . . . .	1900
Baldwin, L. C. M. . . . .	1913	Barnes, L. F. . . . .	1916
Ball, E. F. . . . .	1888	Barnett, H. A. . . . .	1910
Ball, F. W. . . . .	1916	Barrett, R. H. (deceased) . . . . .	1901
Ball, O. V. . . . .	1920	Barrett, J. H. . . . .	1904
Ball, W. V. . . . .	1915	Barry, W. H. . . . .	1909
Ballantyne, H. F. . . . .	1893	Bartlett, E. . . . .	1908
Ballinger, J. G. . . . .	1918	Bartley, T. H. . . . .	1911
Banbury, T. R. . . . .	1915	Bates, M. (deceased) . . . . .	1906
Banigan, J. . . . .	1917	Batten, H. L. . . . .	1911
Banks, H. R. . . . .	1914	Beacock, V. A. . . . .	1915
Banting, E. W. . . . .	1906	Beatty, F. W. . . . .	1913

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 179

Beatty, H. J.	1891	Boswell, M. C.	1900
Beatty, J. A.	1903	Boswell, W. O. (deceased)	1911
Beatty, W. B.	1913	Bothwell, R. S. C.	1917
Beatty, W. G.	1901	Boulton, W. J.	1909
Beauregard, A. T.	1894	Bourne, O. B.	1907
Beckstedt, R.D.S.	1909	Boustead, W. E. (deceased)	1890
Bedard, E. L.	1914	Bow, J. A.	1897
Bedard, H. J.	1914	Bowen, G. H.	1909
Bedford, F. J. (deceased)	1908	Bower, J. H. W.	1914
Begg, W. A.	1905	Bowers, W. J. (deceased)	1901
Beith, R. E.	1909	Bowes, H. F.	1908
Belcher, J. T.	1914	Bowman, A. M.	1886
Bell, C. A.	1913	Bowman, E. P.	1910
Bell, G. G.	1905-1908	Bowman, F.	1911
Bell, R. S.	1913	Bowman, F. M.	1890
Bellisle, J. P. (deceased).	1906	Bowman, H. D.	1907
Bemrose, B. W.	1916	Bowman, H. J.	1885
Bennett, G. A.	1909	Boyd, D.	1916
Bennett, G. C.	1920	Boyd, D. G.	1894
Bennett, P.	1915	Boyd, W. H.	1898
Bennett, S. G.	1914	Brace, J. H.	1908
Bergey, A. E.	1894	Brackinreid, T. W.	1911
Berkeley, G. L.	1911	Brady, W. S.	1907
Berry, A. E.	1917	Brandon, E. T. J.	1901
Berry, E. W.	1910	Brandon, H. E.	1906
Bertram, G. M.	1910	Bray, L. T.	1900
Betts, H. H.	1906	Brebner, G. (deceased)	1895
Beynon, D. E.	1906	Brecken, P. R.	1908
Billings, J. H.	1911	Breithaupt, J. E.	1915
Bingham, H. C.	1910	Brereton, L. R.	1913
Binns, P. V. (deceased)	1914	Brereton, W. P.	1901
Binns, R. E.	1913	Breslove, J.	1903
Birchard, E. R.	1909	Breuls, H. E.	1916
Birdsall, E.	1120	Brian, M. E.	1906
Birrell, W. G.	1916	Bristol, W. M.	1905
Bissett, D. G.	1910	Broadfoot, F. C.	1906
Bissett, G. W. (deceased)	1906	Brock, A. F.	1910
Bissett, J. R.	1911	Brock, W. M.	1911
Bitzer, A. M.	1920	Brodie, W. M.	1895
Black, B. S.	1913	Broughton, G. H.	1907
Black, G. E.	1908	Broughton, J. T.	1902
Black, H. M.	1915	Brouse, E. D. G.	1915
Black, W. D.	1909	Brouse, W. H. D.	1911
Blackwell, R. H. H.	1910	Brown, B.	1913
Blackwood, A. E.	1895	Brown, C. E.	1909
Blackwood, W. C.	1906	Brown, D. B.	1888
Blain, D.	1913	Brown, E. I.	1908
Blair, W. J.	1902	Brown, G. L.	1893
Bleakley, J. F.	1885	Brown, H. O.	1911
Blizard, D. C.	1909	Brown, H. H.	1914
Blyth, J. M.	1914	Brown, H. S.	1917
Boeckh, J. C.	1906	Brown, J. A.	1907
Bonham, A. R.	1914	Brown, J. M.	1902
Bonnell, M. B.	1904	Brown, L. L.	1895
Booth, F. W.	1920	Brown, L. R.	1915
Bonter, E. R.	1913	Brown, N. B.	1916
Bonus, W. H.	1915	Brown, T. D.	1904
Boswell, E. J.	1895	Brown, T. W.	1906

Brown, W. D.....	1914	Burden, H. J.....	1915
Brown, W. D.....	1919	Burgess, E. L.....	1903
Browne, E. W.....	1909	Burgess, J. R.....	1910
Browne, M. O.....	1910	Burley, R. J.....	1904
Browne, W. J.....	1919	Burn, G. A. H.....	1920
Bruce, W. J.....	1907	Burns, D. (deceased)	1883
Bryce, W. F. M.....	1908	Burns, J. C. (deceased)	1887
Buchan, P. H.....	1908	Burns, J. E.....	1909
Buchanan, F. M.....	1915	Burnham, F. W.....	1904
Buchanan, J. A.....	1909	Burnham, N. G. H. (deceased)	1910
Buchanan, T. R.....	1913	Burnside, J. T. M. (deceased)	1899
Buchanan, W. B.....	1913	Burrows, B. H. A. (deceased)	1913
Bucke, M. A. (deceased)....	1890	Burton, C. E.....	1920
Bucke, W. A.....	1894	Burwash, L. T.....	1896
Budd, H. C.....	1915	Burwash, N. A.....	1903
Bumstead, S. W.....	1917	Bush, C. E.....	1907
Bunnell, A. E. K.....	1906	Byam, F. M.....	1906
Burd, J. H.....	1903		

## C

Cain, E. T.....	1911	Carrie, G. M.....	1913
Calder, J. W.....	1904	Carroll, A. M.....	1908
Caldwell, H. J.....	1919	Carroll, M. J.....	1906
Caldwell, W. B.....	1913	Carscallen, H. R.....	1908
Cale, W. C.....	1910	Carson, W. R.....	1905
Cameron, N. C.....	1904	Carter, J. M.....	1914
Cameron, A.....	1906	Carter, W. E. H (deceased)	1898
Cameron, M. G.....	1909	Caster, J. H.....	1907
Cameron, C. S.....	1911	Catto, R. W.....	1915
Cameron, O. L. (deceased)....	1913	Caudwell, N. S.....	1910
Campbell, A. D.....	1910	Cavana, E. L.....	1920
Campbell, A. J.....	1904	Cavell, E.....	1907
Campbell, A. M.....	1904	Centner, M. H.....	1920
Campbell, D. H.....	1914	Chace, W. G.....	1901
Campbell, H. M.....	1914	Chadwick, R. E. C.....	1906
Campbell, J. J. (deceased)....	1914	Chadwick, W. W.....	1911
Campbell, W. G.....	1902	Challen, G.....	1908
Campbell, A. R. (deceased)....	1902	Challies, J. B.....	1903
Campbell, R. J.....	1895	Chalmers, W. J.....	1889
Campbell, G. M.....	1896	Chalmers, J.....	1894
Campbell, L. L.....	1913	Chambers, E. V.....	1914
Campbell, W. C.....	1905	Chambers, J. L.....	1920
Campbell, N. A.....	1908	Chandler, R. B.....	1911
Campbell, R. A.....	1909	Chapman, J. R. (deceased)	1916
Campbell, A. W.....	1906	Charlesworth, L. C.....	1893
Campbell, J. E.....	1908	Charlton, H. W.....	1897
Campbell, C. D.....	1911	Chase, A. V.....	1905
Campbell, T. W.....	1919	Cheney, S. K.....	1920
Candee, C. N.....	1914	Cherry, P. G.....	1911
Canniff, C. M.....	1888	Chesnut, A. W. (deceased)	1910
Carey, B.....	1889	Chesnut, E. F.....	1911
Carlyle, R. T.....	1914	Chesnut, F. H.....	1908
Carlyle, W. M. (deceased)....	1910	Chesnut, V. S.....	1909
Carmichael, C. G. (deceased)....	1902	Chewett, H. J.....	1888
Carmichael, F. N. D.....	1915	Chilver, C. A.....	1904
Carmichael, R. M.....	1913	Chilver, H. L.....	1904
Carpenter, H. S.....	1897	Chisholm, D. C.....	1910

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 181

Christie, F. C.	1917	Cook, J. D. (deceased)	1915
Christie, W.	1902	Cook, W. A. Mc.	1906
Christie, U. W.	1904	Coombs, J. A.	1913
Christie, A. G.	1901	Coon, H. F.	1920
Christie, R. M.	1914	Coon, B. R.	1913
Chubbuck, L. B.	1899	Cooper, C.	1899
Clark, H.	1913	Corbould, C. E. B.	1914
Clark, J.	1900	Corman, E. H.	1917
Clark, G. T.	1906	Corman, H. E.	1920
Clark, F. W.	1911	Corman, W. E.	1909
Clark, H. J.	1911	Cornell, C. W.	1911
Clark, H. S.	1910	Corrigan, G. D. (deceased)	1890
Clark, J. E.	1919	Corrigan, T. E.	1905
Clarke, F. F.	1903	Cory, R. Y.	1908
Clarry, A. R.	1919	Coulson, C. L.	1903
Clarkson, G. E.	1913	Courtice, E. D. W.	1914
Claveau, J. A.	1910	Cousins, E. L.	1906
Cleary, F. S. (deceased)	1911	Coulthard, R. W.	1899
Clegg, B. D.	1913	Cowan, E. C.	1919
Clement, W. A.	1889	Cowan, W. A. (deceased)	1904
Clement, S. R. A.	1905	Cowper, G. C.	1907
Cline, C. G.	1909	Coyne, H.	1908
Clipsham, K. M.	1914	Craig, J. A.	1899
Clothier, G. A.	1899	Craig, J. H.	1910
Coates, P. C.	1904	Craig, S. E.	1904
Cockburn, J. R.	1901	Crashley, J. W.	1914
Cockburn, L. S.	1910	Crawford, A. W.	1914
Cockburn, R. M.	1915	Crealock, A. B.	1915
Code, A. G.	1910	Creighton, A. G.	1906
Code, S. B.	1904	Crerar, S. R.	1904
Code, T. F. (deceased)	1904	Crosby, E.	1920
Cody, H. B.	1920	Crosby, N. L. R.	1905
Cole, D. B.	1911	Crosby, T. H.	1909
Cole, W. E. (deceased).	1908	Crouch, M. E.	1911
Cole, C. R.	1910	Cruthers, W. M.	1911
Coleman, J. H.	1913	Crysler, R. A.	1920
Coleman, R. M.	1907	Culbert, M. T. (deceased)	1902
Colhoun, G. A.	1906	Culbert, J. V.	1907
Collaran, J. C.	1917	Cumming, J. D.	1908
Collett, W. C.	1908	Cumming, R.	1902
Collinson, J. G.	1909	Cumming, K. N.	1916
Colquhoun, G. A.	1910	Cummins, O. F.	1911
Coltham, G. W.	1909	Cunerty, T. J.	1911
Conlon, F. T. (deceased)	1902	Cunningham, C. H.	1911
Connell, C. B. B.	1907	Cunningham, J. N. (deceased)	1916
Connor, A. W.	1895	Cunningham, R. H.	1909
Connor, H. V.	1902	Currie, W. M.	1904
Cooch, H. A.	1909	Curtis, W. T.	1913
Cook, A. S.	1911	Curzon, J. H.	1911
Cook, G. M.	1913	Cuthbertson, W.	1914

D

Da Costa, W. R.	1915	Dallyn, F. A.	1909
Dafoe, E. R.	1920	D'Alton, F. K.	1911
Dahl, A. D.	1908	Dalton, G. F.	1914
Dale, R. S.	1916	Dandeno, L. G.	1916
Dale, W. P.	1920	Daniel, N. H.	1915

Daniels, W. N.	1906	Dibblee, J.	1915
Danks, F. A.	1908	Dickinson, E. D.	1900
Danks, C. N.	1909	Dickson, G. W.	1900
Dann, E. M. (deceased)	1909	Dickson, J. V.	1917
Darling, E. H.	1898	Dickson, W. L.	1915
Dancey, W. A.	1920	Dill, C. W.	1891
Daniel, T. A.	1920	Dingman, A. H.	1920
Darroch, J.	1908	Dixon, H. A.	1900
Dashwood, R.	1914	Dobbin, R. L.	1910
Dates, A. J.	1913	Dobbin, W. L.	1916
Davey, C. G.	1915	Dobie, J. S.	1895
Davidson, R. D.	1914	Dobson, W. P.	1910
Davidson, G. P. (deceased)	1915	Dodds, W. A.	1909
Davidson, J. J.	1915	Doncaster, L. W.	1911
Davis, R.	1907	Doorly, H. C. (deceased)	1908
Davis, A. I.	1909	Douglas, F. W.	1914
Davis, H. W.	1909	Douglas, R. H.	1908, 1909
Davis, H. C.	1909	Douglas, W. E.	1902
Davis, W. B.	1911	Dowling, H. L.	1919
Davison, J. E.	1900	Downey, G. A.	1915
Davison, A. E.	1903	Downing, F. H.	1911
Davison, H. D.	1913	Duff, A. R.	1909
Dawson, I. H. (deceased)	1909	Duff, C. K.	1918
Deacon, T. R.	1891	Duff, J. A. (deceased)	1890
Dean, C. D.	1910	Duff, M. O. (deceased)	1909
Dean, W. A.	1915	Duff, W. A.	1901
Death, N. P. F.	1909	Duggan, G. H.	1883
DeCew, J. A.	1896	Dunbar, W. B.	1911
De Guerre, F. C. (deceased)	1911	Duncan, J. M.	1910
Deitch, E. L.	1913	Duncan, W. G.	1913
Delahaye, W. H.	1909	Dundass, C. S.	1906
Delamere, R. D.	1914	Dunlop, R. J.	1902
De Laporte, A. V.	1910	Dunn, T. H.	1893
Delisle, J. L.	1916	Durand, R. A.	1919
Depew, H. H.	1904	Dustan, E. B.	1920
Derham, W. P.	1909	Duthie, L. J.	1909
Deverall, E. V.	1915	Dyer, F. C.	1908
Diamond, R. W.	1913		

**E**

Eadie, L. F.	1910	Elliott, H. P.	1896
Eagleson, F. M.	1908	Elliott, J. C.	1899
Eason, D. E.	1901	Ellis, F. D.	1918
Eastwood, J. H.	1916	Ellis, S. D. (deceased)	1914
Eckert, C. H.	1911	Elwell, W. (deceased)	1902
Edmonds, C. W.	1919	Emery, V. H.	1910
Edwards, W. M.	1902	Emmerson, E. R.	1915
Edwards, C.	1908	Empey, J. M.	1902
Edwards, G. R.	1915	English, A. B. (deceased)	1890
Edwards, H. C.	1914	Evans, A. C.	1915
Elder, A. J.	1904	Evans, S. D.	1907
Elliot, J. A.	1911	Evans, S. L.	1908
Elliot, R. V.	1915	Evans, W. J.	1910
Elliott, J. A.	1914	Ewart, J. A.	1894
Elliott, G. R.	1911	Ewart, F. R.	1907
Elliott, C. F.	1911	Ewing, E. O.	1908
Elliott, H. F.	1914	Eyres, H. E.	1914

**F**

Faill, J.	1920	Foote, F. F.	1913
Fairbairn, J. M. R.	1893	Forbes, D. L. H.	1902
Fairchild, C.	1892	Ford, A. L.	1904
Fairclough, H. W. J.	1918	Ford, J. W. H.	1915
Fairlie, H. W.	1910	Foreman, J. L.	1914
Falconer, F. S.	1909	Foreman, J. M.	1910
Falconer, H. S. (deceased)	1915	Forman, J. H.	1919
Falls, O. M.	1914	Forman, W. E.	1899
Fargey, T. A.	1909	Forrester, C.	1893
Farrell, K. A.	1911	Forster, C.	1920
Farrelly, T. J.	1911	Forward, E. A.	1897
Fear, S. L.	1906	Forward, C. C.	1906
Fensom, C. J.	1903	Foster, A. H.	1908
Ferguson, C. R.	1910	Foster, W. J.	1910
Ferguson, D. G.	1914	Foulds, W. C.	1910
Ferguson, G. H.	1905	Francis, Walter J.	1893
Ferguson, J. B.	1909	Francis, G. C.	1908
Ferguson, J. W.	1910	Frankel, E. L.	1911
Fergusson, A. T.	1909	Franklin, H. J.	1914
Fierheller, H. S. (deceased)	1905	Fraser, A. (deceased).	1910
Fingland, W.	1893	Fraser, J. A.	1917
Fiddes, F. R.	1913	Fraser, R. A.	1918
Fisken, J. B. K.	1910	Fraser, W. R.	1915
Flanagan, O. L.	1908	Fredin, J.	1910
Flannery, D. T.	1915	Freeland, E. E.	1911
Fleck, J. G.	1904	Freeman, T. E.	1909
Flegg, R. L.	1916	Freeman, J. R.	1911
Fleming, D. H.	1913	French, W. G.	1915
Fleming, G. O.	1914	Frid, H. P.	1911-1915
Fleming, G. R. S. (deceased)	1907	Frost, E. R.	1909
Fleming, J. S. (deceased)	1914	Frost, J. G. G.	1914
Fletcher, A. W.	1910	Fuce, E. O.	1903
Fletcher, F. T.	1910	Fuller, C. H. R.	1914
Fletcher, J. A.	1910	Fuller, R. J.	1911
Flint, C.	1908	Fullerton, C. H.	1900
Flint, T. R. C.	1910	Fulton, W. J.	1915
Flook, S. E.	1911	Fux, P. C.	1907
Flynn, C. C.	1911	Fyfe, H. O.	1911
Follett, R. C. (deceased)	1910		

**G**

Gaby, F. A.	1903	George, R. E. (deceased)	1903
Gage, C. E.	1918	German, A. M.	1913
Gagne, S. (deceased)	1901	Gibbons, J..	1888
Galbraith, J. S.	1913	Gibson, A. E.	1902
Galbraith, R. D. (deceased)	1915	Gibson, J. M.	1910
Gall, H.	1910	Gibson, M. M.	1910
Galletly, J. S.	1907	Gibson, N. R.	1901
Galt, G. (deceased)	1907	Gibson, W. S.	1904
Gardner, D. B.	1916	Gill, E. I..	1914
Gardner, J. C.	1903	Gill, J. R..	1914
Garland, M. L.	1890	Gillespie, P.	1903
Garnham, W. H. (deceased)	1913	Gilley, E. R.	1920
Garrow, A. B.	1907	Gillies, A..	1907
Geale, C. N.	1915	Glass, L. G.	1915
Gear, S. S.	1908	Glover, A. E.	1909

Goad, V. A. E.....	1910	Gray, A. G.....	1913
Goldie, A. R.....	1893	Gray, A. T.....	1897
Goodall, J. N.....	1904	Gray, A. J.....	1913
Gooderham, A. E.....	1909	Gray, E. D.....	1915
Gooderham, G. A. (deceased)	1915	Gray, E. R.....	1913
Gooderham, J. L.....	1911	Gray, G. D.....	1915
Goodeve, V. S.....	1910	Gray, G. S.....	1915
Goodman, H. M.....	1913	Gray, J.....	1906
Goodridge, H.....	1910	Gray, J.....	1915
Goodwin, A. C.....	1902	Gray, J. E.....	1909
Goodwin, J. B.....	1892	Gray, W. W.....	1904
Gordon, J. P.....	1904	Greatrex, W. K.....	1917
Gordon, W. A.....	1910	Green, R. E.....	1911
Gouinlock, R. W.....	1914	Greene, E. A.....	1911
Gould, W. H. R. (deceased)	1915	Greene, G. E. D.....	1909
Gourlay, V. F.....	1910	Greene, P. W.....	1906
Gourlay, W. A.....	1903	Greene, R. L.....	1910
Graham, C. W. (deceased)	1906	Greene, W. H.....	1909
Graham, C. W.....	1920	Greenwood, W. K. (deceased)	1904
Graham, D. A.....	1909	Grierson, C. I.....	1914
Graham, E. B.....	1910	Griffiths, G. E.....	1915
Graham, G. W.....	1907	Guernsey, F. W.....	1895
Graham, T. S.....	1915	Gulley, C. L.....	1908
Gram, J. I.....	1917	Gunn, W. W.....	1909
Grange, E. R.....	1915	Gurnett, E. G.....	1916
Grant, W. F. (deceased)	1898	Gurney, W. C. (deceased)	1896
Grant, R. R.....	1909	Gurofsky, M.....	1916
Grasett, C. S.....	1907	Guest, W. S.....	1900
Grassie, C. A.....	1908	Guy, E.....	1899
Gray, A. (deceased)	1904		

**H**

Haas, M. S.....	1915	Hanning, G. F.....	1889
Hackner, J. W.....	1908	Hara, L. D.....	1904
Hadcock, J. P.....	1913	Harcourt, F. Y.....	1903
Hagarty, R. E. W.....	1907	Harcourt, H. E.....	1911
Hagedorn, G. C.....	1916	Hardie, R. C.....	1920
Hagerman, F. G.....	1909	Hare, R. A.....	1907
Haight, H. V.....	1896	Hare, R. M.....	1916
Halford, D. S.....	1915	Hare, W. A.....	1899
Hall, H. G.....	1911	Harkins, J. M.....	1919
Hall, K.....	1907	Harkness, A. H.....	1895
Hall, W. H.....	1914	Harkness, A. L.....	1906
Hall, W. T. (deceased)	1915	Harman, W.....	1920
Hally, G. H.....	1914	Harper, C. J.....	1909
Hambleton, A.....	1920	Harris, A. B.....	1917
Hamer, A. T. E.....	1901	Harris, C. J.....	1904
Hamilton, J. F.....	1903	Harris, J. H.....	1910
Hamilton, C. B.....	1906	Harris, H. C.....	1913
Hamilton, C. T.....	1907	Harris, R. W.....	1917
Hamilton, G. M.....	1911	Harrison, R.....	1920
Hancock, C. W.....	1918	Harrison, R. L.....	1906
Hanes, G. S.....	1903	Harrison, F. H.....	1905
Hanley, S. C.....	1893	Harrison, E.....	1906
Hanlon, J. E.....	1915	Harron, L. W.....	1916
Hanmer, G.....	1917	Hartney, J. C. (deceased)	1906
Hanna, J. J.....	1914	Harvey, C.....	1901

Harvey, D. W.	1909	Hinch, E. F.	1910
Harvie, N. J. (deceased)	1910	Hogarth, B. B.	1914
Hastings, C. E.	1916	Hogarth, C. E.	1915
Hastings, M. B.	1911	Hogarth, G.	1909
Haultain, H. E. T.	1889	Hogg, T. H.	1907
Haviland, F. L.	1908	Hodge, R. T. C.	1916
Hawes, J. H.	1914	Holcroft, H. S. (deceased)	1900
Hawley, H. A.	1913	Holden, A. J.	1917
Hay, C. O. (deceased)	1909	Holden, O.	1913
Hayes, L. J.	1903	Holland, U. C.	1920
Hayman, L. T.	1914	Holmes, A. E.	1909
Hayward, C.	1915	Holmes, C. R.	1909
Hearn, R. L.	1913	Hookway, C. W.	1906
Heebner, M. B.	1911	Hoover, O. H.	1910
Heinonen, H. J.	1913	Hopkins, P. E.	1910
Helliwell, J. G. (deceased)	1910	Hopkins, R. H.	1906
Helson, F. I.	1911	Hopper, G. H.	1919
Hemphill, W.	1900	Horton, J. A.	1903
Hemphill, J.	1909	Hoshal, G. C.	1909
Henderson, E. E.	1885	Houston, R. S.	1906
Henderson, F. D.	1903	Howard, J. T. (deceased)	1913
Henderson, J. F.	1910	Howlett, T. F.	1913
Henderson, M. G.	1920	Hubbert, S.	1916
Henderson, S. E. M.	1900	Huber, W.	1906
Henderson, C. D.	1908	Huestis, R. D.	1920
Hendry, M. C.	1905	Huether, A. D.	1908
Henry, J. A.	1900	Huether, D. J.	1908
Henry, R. A.	1913	Huff, A. J.	1911
Henwood, C.	1902	Huffman, K.	1911
Herald, W. J.	1894	Hughes, C. (deceased)	1909
Hermon, E. B.	1886	Hughes, C. A.	1920
Heron, J. B.	1904	Hugill, O. H.	1920
Hertzberg, C. S. L.	1905	Hugli, E. E. H.	1914
Hertzberg, H. F. H.	1907	Hull, H. S.	1895
Hess, J. E.	1919	Hull, A. H.	1906
Hett, S.	1906	Hunter, A. E. (deceased)	1909
Hewson, E. G.	1908	Hunter, A. N.	1908
Hewson, W. G.	1905	Hunter, W. H.	1920
Hickling, F. G.	1910	Hurlburt, R. W.	1917
Hicks, W. A. B.	1897	Husband, L. B.	1920
Higgins, L. T.	1915	Hustwitt, S. A.	1914
Hill, C. R.	1920	Hutcheon, J.	1890
Hill, Miss E. M.	1920	Hutcheson, G. F.	1917
Hill, E. M. M.	1904	Hutchings, W.	1914
Hill, H. O.	1907	Hutton, C. H.	1907
Hill, H. R.	1911	Hyatt, H.	1911
Hill, S. N.	1904	Hyland, H. M.	1907
Hill, T. A.	1913	Hyman, B.	1918
Hillis, C. R. (deceased)	1906	Hyman, E. W.	1907

## I

Iller, S. B.	1908	Ironside, G. A.	1915
Illman, N. H.	1920	Irvin, W. F.	1920
Ingles, C. J.	1904	Irvine, J. (deceased)	1889
Innes, W. L.	1890	Irwin, H.	1909
Ireland, L. G.	1907	Irwin, W. J.	1910
Ireland, T. P.	1915	Isbister, J.	1909
Ireson, E. T.	1913		

**J**

Jackes, F. P. (deceased).....	1909	Johnston, E. W. ....	1920
Jackson, C. W. H.....	1915	Johnston, G. W. F. ....	1915
Jackson, J. G.....	1903	Johnston, H. ....	1903
Jackson, F. C.....	1901	Johnston, H. C. ....	1910
Jackson, W.....	1907	Johnston, A. C. ....	1894
Jackson, C. B.....	1907	Johnston, D. M. ....	1902
Jackson, J. E.....	1909	Johnston, H. A. ....	1900
Jackson, K. B.....	1916	Johnston, J. C. ....	1900
James, D. D.....	1889	Johnston, J. A. ....	1900
James, E. A.....	1904	Johnston, C. K. ....	1903
James, E. W.....	1909	Johnston, R. H. ....	1910
James, F. L.....	1910	Johnston, W. J. ....	1909
James, O. S.....	1891	Johnston, C. ....	1906
Jamieson, E. A.....	1910	Johnston, C. E. (deceased)....	1909
Jannati, A. S.....	1914	Johnston, J. T. ....	1908
Jarvis, R. H. (deceased) .....	1911	Johnston, S. H. ....	1919
Jefferson, K. A.....	1915	Jones, C. M. ....	1915
Jeffrey, C. C.....	1910	Jones, G. R. ....	1906
Jeffrey, D.....	1882	Jones, G. S. ....	1905
Jepson, W. C.....	1906	Jones, J. E. ....	1894
Jermyn, P. V.....	1904	Jones, L. E. ....	1911
Job, H. E.....	1894	Jones, R. D. ....	1915
Johnson, C. C.....	1909	Jones, T. (deceased)....	1906
Johnson, G. R.....	1913	Julian, F. T. ....	1920
Johnson, R. P.....	1914	Jupp, A. E. ....	1906
Johnson, S. M.....	1894	Jupp, E. H. ....	1915
Johnston, E. F.....	1918	Junkin, R. L. ....	1913

**K**

Kamman, J. I.....	1914	Keys, W. R. ....	1908
Karn, H. C.....	1916	Kidd, W. S. ....	1920
Kay, J. (deceased).....	1914	Killip, W. C. ....	1908
Kay, E. W.....	1907	Kilmer, C. E. ....	1913
Kearns, N.....	1919	King, C. F. ....	1897
Keefe, W. S. H.....	1904	King, G. F. ....	1916
Keefer, N. G.....	1914	King, J. T. ....	1910
Keele, J.....	1893	Kinghorn, A. A. ....	1907
Keffer, A. H. E.....	1909	Kingstone, G. A. ....	1910
Keith, J. C.....	1910	Kirby, J. R. (deceased)....	1916
Keith, D. F.....	1907	Kirby, R. W. ....	1916
Keith, H. P.....	1907	Kirkland, W. C. (deceased)....	1884
Kelleher, J.....	1920	Kirkwood, M. ....	1911
Kelly, E. A.....	1911	Kirn, R. W. ....	1916
Kelly, S. S.....	1913	Kirwan, G. L. ....	1910
Kemp, J. B. O.....	1909	Kirwan, P. T. ....	1910
Kennedy, J. H.....	1882	Klingner, L. W. ....	1907
Kennedy, H. G.....	1908	Klotz, H. N. (deceased)....	1909
Keppy, J. D. (deceased)	1906	Knight, J. A. ....	1914
Kerby, H. S.....	1914	Knight, R. H. ....	1902
Kerman, H. C.....	1920	Knight, S. ....	1910
Kerr, A. E.....	1913	Kohl, H. ....	1915
Kerr, J. A.....	1914	Kormann, J. S. ....	1898
Kewin, G. E.....	1914	Kribs, G. ....	1905
Key, W. R.....	1909	Krug, S. J. ....	1916
Keys, C. R.....	1915		

**L**

Laidlaw, J. T.	1893	Lee, R. G.	1910
Laidlaw, R. A.	1901	Lee, W. A. (deceased)	1892
Laidlaw, R. E.	1915	Leighton, J. W.	1905
Laing, A. T.	1892	Leitch, J. N. (deceased)	1910
Laing, J. S.	1913	Lennox, A. E.	1909
Laing, P. A.	1905	LePan, A. D.	1907
Laing, W. F. (deceased)	1896	Leslie, A.	1913
Laird, R. (deceased)	1886	Leslie, J. N. M.	1908
Lamb, F. C.	1907	Lesperance, L. J.	1919
Lamb, G. J.	1915	Lethbridge, W. R.	1911
Lamont, A. W.	1909	Levesque, L. (deceased)	1917
Lancaster, H. M.	1906	Lewis, F. C.	1908
Lane, A. (deceased)	1891	Lieberman, M.	1911
Lang, A. G.	1903	Lillie, G. L.	1911
Lang, J. L.	1906	Lindsay, J. H.	1907
Lang, S. A. (deceased)	1914	Lindsay, R. E.	1914
Langley, C. E.	1892	Linton, A. P.	1906
Langmuir, F. L.	1902	Little, H. B.	1920
Langmuir, C. B.	1909	Livingston, H. D. (deceased)	1913
Lanning, J.	1911	Lloyd, N. C. A.	1909
Larkworthy, W. J. (deceased)	1904	Lloyd, R. H.	1915
Laschinger, E. J.	1892	Lockhart, W. E. (deceased)	1915
Lash, F. L.	1893	Long, A. L.	1911
Lash, N. M.	1894	Longstaff, J. C.	1910
Latham, R.	1899	Longworthy, W. E.	1915
Latimer, C. W.	1914	Lorimer, N. H.	1914
Latornell, A. J. (deceased)	1903	Lott, A. E.	1887
Latornell, A.	1905	Loucks, R. W. E.	1909
Lavrock, J. E. (deceased)	1898	Loudon, T. R.	1905
Lawler, E. R.	1910	Lount, C. T.	1915
Lawless, N. (deceased)	1911	Lowrie, A. W. P.	1911
Lawrence, G. W.	1915	Ludgate, B. A.	1885
Lawson, W. L.	1892	Lumbers, W. C.	1901
Lawrie, R. R. (deceased)	1896	Lye, O. G.	1914
Leach, H. O. (deceased)	1915	Lye, R. G.	1915
Leaver, C. B.	1910	Lynar, H. R.	1908
Lee, L. A. C.	1916		

**Mac**

Macallum, A. F.	1893	Macdougall, A. C.	1901
MacAndrews, W. M.	1911	Macfarlane, E. D.	1909
Macaulay, R. V.	1911	MacGregor, A. E.	1910
MacBain, J. T.	1911	MacIntyre, W. B.	1919
MacBeth, C. (deceased)	1896	MacKay, A. G.	1907
MacBeth, R. E. A. (deceased)	1911	MacKay, E. G.	1910
Macdonald, A. D.	1910	MacKay, J. T.	1902
Macdonald, C. A.	1915	MacKendrick, B.	1914
Macdonald, C. E.	1918	Mackenzie, A. M.	1914
Macdonald, G. G.	1917	MacKenzie, H. R.	1913
Macdonald, J. B.	1910	MacKenzie, H. J.	1914
Macdonald, J. A.	1910	MacKenzie, K. A. (deceased),	1906
Macdonald, G. A.	1910	Mackenzie, W. D.	1907
Macdonald, F. M.	1911	MacKenzie, W. S.	1911
Macdonald, R. A.	1916	Mackinnon, J. A.	1911
Macdonald, W. A. (deceased)	1914	Mackinnon, J. G.	1909
Macdonell, I. M.	1915	Mackinnon, W.	1906

Mackintosh, D.	1898	MacMurchy, H. G.	1910
MacLachlan, K. S.	1913	MacMurchy, J. A.	1896
MacLachlan, W.	1906	MacNicol, N.	1919
MacLachlan, W. A.	1909	MacPherson, A. R.	1913
MacLaurin, J. G.	1911	Macpherson, H. E.	1915
Maclean, B. A.	1909	Macpherson, H. N.	1914
MacLennan, G. G. (deceased)	1910	Macpherson, N. W.	1909
MacLeod, D. D. (deceased)	1910	MacQuarrie, A. H.	1914
MacLeod, G.	1907	MacTavish, H. J.	1910
MacMillan, G.	1901	MacTavish, W. H.	1913

**Mc**

McAllister, A. L.	1893	McFaul, W. L.	1913
McAllister, J. E.	1891	McGarry, P. J.	1910
McAlpine, D. D.	1909	McGeorge, W. G.	1908
McAndrew, J. B.	1911	McGhie, W. G.	1911
McAree, J. (deceased)	1882	McGibbon, C. P.	1904
McArthur, A. S.	1909	McGie, W. R.	1915
McArthur, R. E.	1900	McGill, S. B.	1914
McAuslan, H. J.	1903	McGorman, S. E.	1906
McBride, A. H.	1902	McGowan, J.	1895
McBride, T. C.	1910	McGregor, J. M.	1908
McCaffrey, W. R.	1915	McGregor, W. W. (deceased)	1905
McCandlish, S. G.	1917	McGugan, D. F.	1915
McCarthy, T. V.	1913	McGugan, D. J.	1907
McClelland, H. L.	1917	McIlhargey, P. E.	1917
McColl, J. R.	1919	McIlwraith, D. G.	1906
McCollum, C. R.	1909	McIntosh, A. H.	1907
McConnell, A. W.	1906	McIntosh, W. G.	1909
McConnell, R. S.	1913	McIntyre, J. S.	1915
McCordick, A. S.	1909	McKague, E. V.	1915
McCort, C. R.	1915	McKay, C. (deceased)	1904
McCreery, H. J.	1920	McKay, O. (deceased)	1885
McCrodan, B. A.	1916	McKay, W. N.	1895
McCuaig, O. B.	1904	McKechnie, F. H.	1909
McCuaig, P. J.	1909	McKenzie, D. A.	1911
McCulloch, A. L.	1887	McKenzie, D. W.	1905
McCurdy, J. A. D.	1907	McKenzie, J. A.	1906
McDonald, J. P.	1915	McKim, L. R.	1910
McDonald, K. D.	1915	McKinnon, H. L.	1895
McDonald, N. G.	1918	McKnight, J. H.	1909
McDonald, R. C.	1914	McLaren, A. J.	1911
McDougall, J. (deceased)	1884	McLaren, D. L.	1914
McDougall, S. G.	1910	McLean, C. A.	1905
McDowall, R.	1888	McLean, W. N.	1905
McEachren, J. A.	1911	McLean, L. A. (deceased)	1908
McEachern, K. J.	1920	McLeish, A. G.	1911
McElhanney, T. A.	1910	McLellan, R. A.	1911
McElroy, R. W.	1911	McLennan, A. L.	1902
McEntee, B.	1892	McLeod, E. W.	1918
McEwen, G. G.	1904	McLeod, G.	1909
McEwen, H. J.	1911	McMaster, A. T. C.	1901
McFarlane, J. A.	1903	McMaster, W. A. A.	1908
McFarlane, W. G.	1904	McMillan, J. G.	1900
McFarlane, J. B.	1907	McMillan, D.	1904
McFarlen, G. W.	1888	McMillan, V.	1909
McFarlen, T. J.	1893	McMordie, H. C.	1908

McNab, J. V.	1906	McPherson, W. B.	1911
McNamara, C. J.	1920	McQuarrie, M. K.	1907
McNaughton, A. L.	1903	McQueen, A. A.	1911
McNaughton, F. W.	1898	McRoberts, A. A.	1908
McNeill, F. W.	1907	McSloy, J. I.	1910
McNiven, J.	1910	McTaggart, A. L.	1894
McPherson, A. J.	1893	McVean, H. G.	1901
McPherson, J. A.	1906		

## M

Mace, F. G.	1905	Meadows, C. A.	1911
Macpherson, G. L.	1920	Meadows, W. W.	1895
Madden, J. F. S.	1902	Meahan, P. W.	1914
Maddock, C. O.	1918	Mechin, F. C.	1914
Madge, N. G.	1908	Meitz, W. H.	1915
Madill, H. H.	1911	Melson, J. W.	1907
Main, W. T.	1893	Mendizabal, A. R.	1918
Maisonville, A. W. R.	1910	Mennie, R. S.	1902
Malcolm, A. L.	1909	Menzies, J. M.	1906
Malcolmson, W. S.	1907	Merrill, E. B.	1890-1891
Malone, J. E.	1908	Merriman, H. O.	1910
Manning, N. H.	1909	Merry, F. S.	1920
Manning, R. C.	1917	Middleton, H. T.	1901
Manning, T. R.	1920	Mickle, G. R.	1888
Manson, G. J.	1904	Mickleborough, K. F.	1913
Manson, A. B.	1909	Mickler, G. J.	1913
Marani, C. J.	1888	Mill, F. X. (deceased).	1889
Marani, V. G.	1893	Millar, W. G.	1914
Margison, O.	1916	Miller, D. J.	1910
Marlatt, K. D.	1908	Miller, A. S.	1914
Marr, N.	1910	Miller, L. Haun	1900
Marriott, F. G.	1903	Miller, M. L.	1903
Marrs, C. H.	1902	Miller, L. R.	1906
Marrs, D. W.	1906	Milligan, G. L.	1908
Marshall, J. A.	1914	Milligan, F. S.	1910
Marshall, J. A. P.	1914	Milligan, W. E.	1914
Marshall, R. J.	1908	Millman, N. C.	1913
Marshall, S. A.	1907	Mills, F. L.	1915
Martin, E. T.	1915	Mills, G. G.	1907
Martin, F.	1887	Mills, P. E.	1910
Martin, J. C.	1911	Mills, P. H.	1914
Martin, W. H.	1910	Mills, L. G.	1911
Martin, T.	1896	Milne, C. G. (deceased).	1892
Martindale, E. S.	1909	Mines, W.	1893
Martyn, O. W.	1909	Minns, J. B.	1907
Mason, D. H. C.	1907	Minty, W.	1894
Mathers, A. S.	1917	Mitchell, A. B.	1908
Matheson, W. C.	1901	Mitchell, B. F.	1906
Mathison, P.	1901	Mitchell, C. H.	1892
Matthews, A. C.	1910	Mitchell, G.	1915
Matthews, R. G.	1914	Mitchell, J. S.	1914
Matthews, F. J.	1919	Mitchell, L. C.	1911
Maus, C. A.	1903	Mitchell, M. H.	1920
Maxwell, H. W.	1914	Mitchell, P. H.	1903
Maxwell, W. A.	1906	Mitchell, R. C.	1918
Maynard, H. V.	1907	Mitchell, W. B.	1916
Meader, C. H.	1910	Moberley, H. K.	1889

Moffatt, R. W.	1905	Morris, B. M. (deceased)	1915
Mogan, J. T.	1915	Morris, C. A.	1909
Molesworth, G. N.	1907	Morris, J. L.	1881
Molesworth, J. C. P. (deceased)	1908	Morris, W. D.	1915
Mollard, W. A.	1919	Morrison, D.	1914
Monds, W.	1899	Mortimer, F. R. (deceased)	1910
Monk, E. D.	1908	Morton, G.	1909
Montague, F. F.	1906	Mowbray, F. E. H.	1908
Montague, J. R.	1914	Muir, J. M.	1915
Monteith, E. M.	1915	Mullins, E. E.	1903
Montgomery, R. H.	1903	Mullins, G. J.	1914
Moody, F. H.	1908	Mulqueen, F. J.	1913
Moore, H. H.	1902	Munro, A. H.	1910
Moore, E. E.	1904	Munro, W. H.	1904
Moore, J. H.	1888	Munro, G. R. (deceased)	1905
Moore, J. E. A.	1891	Munro, F. V.	1909
Moore, F. A.	1903	Muntz, E. P.	1914
Moore, W. J.	1906	Murdie, W. C.	1913
Moore, J. M.	1907	Murdock, C. R.	1906
Moorehouse, E. L.	1920	Murphy, C. J.	1906
Moorhouse, W. N.	1904	Murphy, M. H.	1911
Morden, L. W.	1905	Murray, E. W.	1907
Morgan, J. P.	1910	Murray, J. D.	1907
Morice, J. H.	1908	Murray, W. P.	1908
Morley, P. F.	1907	Murton, J. C.	1911
Morphy, J. A.	1911	Musgrave, J. E. T.	1920
Morris, A.	1915	Mutch, D. A. S.	1913

**N**

Nash, J. C.	1910	Newton, W. E.	1910
Nash, T. S.	1902	Ney, C. H.	1916
Nasmith, M. E.	1908	Nichol, F. T.	1910
Near, W. P.	1906	Nichol, W. J.	1920
Neelands, A. R.	1906	Nicholson, C. J.	1894
Neelands, E. V.	1900	Nicholson, C. L.	1914
Neelands, E. W.	1907	Nicholson, J. B.	1914
Neelands, R. E. K.	1907	Nicklin, H. S.	1915
Neilly, B.	1907	Nicklin, W. G.	1905
Neilson, M. A.	1915	Niebel, E. H.	1911
Neville, E. A.	1909	Nixon, C. K.	1911
Nevitt, I. H.	1903	Noble, E. S.	1911
Newcombe, J. C. (deceased)	1916	Noecker, C.	1914
Newhall, V. A.	1910	Northey, R. K.	1911
Newman, W.	1891	Norwich, H. B.	1919
Newton, J.	1909	Nott, G. E.	1916
Newton, K. L.	1913	Nourse, A. E.	1907

**O**

O'Brien, E. D.	1905	O'Flaherty, J. G.	1920
O'Brien, J. E.	1917	O'Flynn, W. A.	1911
O'Callaghan, E. A.	1916	O'Grady, W. deC.	1908
O'Connor, E. B.	1915	O'Hearn, J. J.	1909
Odell, L. S.	1909	Oke, W. V.	1911
O'Donnell, V. J.	1909	Oliver, C. E.	1916
Offerhaus, W. A. R.	1917	Oliver, E. W.	1903

FACULTY OF APPLIED SCIENCE AND ENGINEERING. 191

Oliver, J. P.	1903	Orr, W. H.	1918
Omand, W. M.	1915	O'Sullivan, J. J.	1907
O'Neil, C. M.	1910	Otto, C. J.	1913
Orr, J. A.	1911	Owens, J. A.	1914

P

Pace, J. D.	1903	Pettingill, R. E.	1906
Pace, G.	1904	Phillips, E. H.	1900
Pae, A. W.	1909	Phillips, H. G.	1908
Palmer, C. E.	1910	Phillips, C. H.	1910
Panter, J. S.	1920	Phillips, E. P. A.	1905
Pardoe, W. S.	1904	Phillips, J. J.	1913
Paris, J.	1904	Phillips, W. E.	1914
Park, D. G.	1906	Philp, D. H.	1903
Park, R. T.	1919	Philp, G. O.	1914
Parke, J. (deceased)	1904	Philp, W. M.	1909
Parker, A. H.	1914	Pick, B. W.	1911
Parker, G. C.	1910	Pickering, A. E.	1904
Parker, J. S.	1911	Pigott, R. B.	1909
Parkin, J. H.	1911	Pinhey, C. H.	1887
Parkinson, N. F.	1913	Pinkney, D. H.	1903
Parr, H. A.	1917	Pivnick, M.	1908
Parsons, J. L. R.	1901	Playfair, N. L.	1892
Paterson, E. L.	1920	Plunkett, T. H.	1903
Paterson, G. W.	1906	Ponton, G. M.	1909
Paterson, W. B.	1919	Pope, A. S. H.	1899
Paton, T. K.	1907	Porte, E. H.	1911
Patten, B. B.	1903, 1905	Porte, W. B.	1905
Patterson, J.	1899	Porter, C. F.	1915
Patterson, R. G.	1914	Porter, C. J.	1909
Patton, J. McD.	1911	Porter, J. E.	1915
Paul, R. A.	1915	Potter, R. B.	1907
Paulin, F. W.	1907	Powell, G. G.	1902
Payne, A. N.	1915	Powell, N. L.	1916
Peaker, W. J.	1904	Powell, W. D.	1915
Pearce, K. K.	1910	Power, G. H.	1901
Pearce, L. P.	1915	Pratt, F. M.	1911
Pearson, A. W.	1910	Prentice, J. M. (deceased)	1892
Pearson, C. L.	1911	Price, H. W.	1901
Pearson, G. P.	1918	Pringle, J. E.	1916
Pearl, J. D.	1914	Prochnow, F. E.	1907
Pearl, J. W.	1913	Proctor, A. I.	1909
Peck, H. M. (deceased)	1915	Proctor, E. M.	1908
Peckover, H. J.	1908	Procunier, J. F.	1907
Pedder, J. R. (deceased)	1890	Proudfoot, H. W. (deceased)	1897
Pennington, C. W.	1914	Publow, C. F.	1908
Pepler, S. J. (deceased)	1911	Pullan, E.	1920
Pequegnat, M.	1908	Pullen, E. F.	1905
Perrin, W. J. (deceased)	1911	Pullan, H.	1911
Perron, E.	1913	Purdy, W. F. P.	1915
Perry, C. V. (deceased)	1914	Purser, R. C.	1906
Peterkin, S. M.	1915	Pye, D. E. (deceased)	1910
Petry, A. M.	1909		

Q

Quail, H. C. (deceased)	1913	Quance, G. E.	1907
Quail, J.	1909	Quinlan, L. J.	1911

## R

Railton, L. W.	1911	Robertson, J. M.	1893
Raine, H.	1907	Robertson, N. R.	1906
Raley, W. E. (deceased)	1915	Robertson, A. R.	1908
Ramsay, W. S.	1910	Robertson, D. F.	1903
Ramsey, G. L.	1905	Robinson, J. K. (deceased)	1891
Ramspurger, A. F.	1909	Robinson, F. J. (deceased)	1895
Rance, C. C.	1915	Robinson, A. H. A.	1897
Raney, P. H. (deceased)	1914	Robinson, L. H.	1904
Rankin, G.	1915	Robinson, W. A.	1908
Rannie, J. L.	1907	Robinson, R. C.	1908
Ransom, J. T.	1908	Robinson, W. E.	1911
Ratz, E. G.	1913	Roblin, H. L.	1911
Ratz, J. E.	1911	Roddick, J. O.	1906
Ratz, R. D.	1917	Rogers, J.	1887
Ratz, W. F. (deceased)	1902	Rogers, C. H.	1906
Raymer, A. R.	1884	Rogers, L. J.	1908
Raymond, D. C.	1904	Rolfson, O.	1906
Rayner, G. W.	1905	Rolph, H.	1894
Read, F. N. (deceased)	1911	Rose, H.	1919
Redfern, B. J. (deceased)	1910	Rose, H. C.	1916
Redfern, W. B.	1908	Rose, J. T.	1915
Redfern, C. R.	1909	Rose, K.	1888
Redman, W. B.	1915	Rose, R. R.	1908
Reed, H. R.	1920	Rosebrugh, T. R.	1889
Reid, E. V. (deceased)	1911	Ross, A. C.	1915
Reid, F. B.	1904	Ross, J.	1915
Reid, F. G.	1915	Ross, J. A.	1892
Reid, W. M.	1919	Ross, J. E.	1888
Relyea, P. J.	1915	Ross, D.	1908
Revell, G. E. (deceased)	1899	Ross, R. A.	1890
Rice, R. H.	1914	Ross, K. G.	1906
Richards, E.	1899	Ross, R. B. (deceased).	1905
Richardson, A. A.	1915	Ross, R. C.	1906
Richardson, C. A.	1920	Ross, S. R.	1916
Richardson, C. E.	1910	Ross, S. W.	1916
Richardson, C. W. B.	1907	Ross, O. W.	1910
Richardson, F. L.	1908	Rothery, L. W.	1911
Richardson, G. H.	1888	Rothwell, T. E.	1905
Richardson, W. A.	1911	Rothwell, H. E.	1907
Richmond, J.	1916	Rothwell, H. D.	1914
Ricker, H. A.	1908	Rounthwaite, C. H. E.	1900
Riddell, J. M.	1913	Rous, C. C.	1913
Riddell, M. R.	1904	Routly, H. T.	1906
Ridler, A. A.	1907	Rovsky, J.	1918
Riehl, W. H.	1920	Rowe, H. M.	1915
Ritchie, H. C.	1910	Rowe, T. L. F.	1911
Ritchie, J. E.	1913	Roxburgh, G. S.	1904
Ritchie, W. W.	1920	Rubidge, W. F. B.	1910
Roaf, J. R.	1900	Runciman, A. S.	1911
Robertson, A. S.	1914	Russel, W. B.	1891
Robertson, A. S.	1915	Russel, R.	1893
Robertson, C. S.	1913	Russell, C. H.	1913
Robertson, F. A.	1908	Russell, J. P.	1916
Robertson, H. D.	1902	Rust, H. P.	1901
Robertson, J.	1884	Rutherford, F. N.	1904
Robertson, J. M.	1914	Rutherford, F. S.	1914

Rutledge, L. T.	1909	Ryan, T. J. L.	1920
Rutley, F. G.	1911	Ryckman, J. H.	1906
Rutter, G. W.	1915		

**S**

Sagar, W. L.	1918	Sheehy, J. S.	1915
Salisbury, E. A.	1920	Sheply, J. D.	1904
Salter, E. M.	1911	Shepley, J. G. (deceased)	1918
Samuel, M.	1918	Sheppard, A. C. T.	1907
Sanders, W. K.	1906	Sheppard, H. L.	1914
Sanderson, A. U.	1909	Sheppard, N. E. D.	1914
Sara, R. A.	1909	Sherman, N. C.	1910
Sauder, P. M.	1904	Shields, J. D.	1894
Sauer, M. V.	1901	Shier, W. G. (deceased)	1915
Saunders, G. A.	1899	Shipley, A. E.	1898
Saunders, H. W.	1900	Shirriff, C. H.	1905
Savage, E. W.	1915	Shoebottom, L. R.	1920
Scandrett, F. R.	1911	Shupe, S.	1914
Scarlett, A. A.	1913	Sibbett, W. A.	1911
Scheibe, H. M.	1903	Sievewright, R. L.	1916
Scheibe, R. R.	1896	Sills, C. P.	1911
Schofield, C. A.	1907	Silvester, G. E.	1891
Schwenger, C. E.	1909	Sime, A. W.	1914
Scott, A. G.	1915	Simpson, B. N.	1914
Scott, C. A.	1909	Simpson, C. N.	1915
Scott, C. R.	1918	Sims, F. R.	1913
Scott, E. H.	1915	Sinclair, D. (deceased)	1902
Scott, G. S.	1905	Sinclair, D. G.	1913
Scott, J. G. (deceased)	1914	Sinclair, C. E.	1914
Scott, Miss H. E.	1911	Sinclair, R. B. (deceased)	1915
Scott, J. W.	1911	Sisson, C. E.	1905
Scott, R. G. (deceased)	1915	Skaith, J. B.	1914
Scott, W. A. (deceased)	1906	Skinner, J. L.	1916
Scott, W. B.	1916	Skinner, W. C.	1914
Scott, W. F.	1897	Slater, F. W.	1904
Seaborne, R. L.	1916	Smallpiece, F. C.	1898
Seaton, N. D.	1911	Smart, R. S.	1904
Secord, A. O.	1908	Smelser, W. A.	1916
Sedgwick, A.	1909	Smiley, R. W.	1897
Segre, B. H.	1909	Smith, A. N.	1892
Seibert, F. V.	1909	Smith, A.	1894
Serson, H. V.	1905	Smith, C. A.	1916
Servos, F. M.	1914	Smith, E. E.	1917
Sewell, L.	1913	Smith, H. G. (deceased)	1903
Seymour, H. L.	1903	Smith, H. M. (deceased)	1914
Seymour, N. F.	1915	Smith, R. W. (deceased)	1898
Shanks, T.	1899	Smith, J. H.	1903
Sharp, M. C.	1913	Smith, D. A.	1904
Sharpe, N.	1911	Smith, K. H.	1911
Shaw, J. H.	1898	Smith, M. L. (deceased)	1911
Shaw, J. H.	1915	Smith, W. C.	1910
Shaw, K. E.	1913	Smith, G. E.	1910
Shaw, W. E. V.	1908	Smith, F. L.	1910
Shaw, M. R.	1909	Smith, F. R.	1907
Shaw, W. C.	1910	Smith, W. J.	1904
Sheard, P.	1911	Smithrim, E. R.	1907
Shearer, H. F.	1908	Smithson, E. W.	1917

Smyth, A. H.. . . . .	1915	Stewart, A. W. J. . . . .	1908
Smyth, G. M. (deceased)	1914	Stewart, N. C. . . . .	1909
Smythe, C. . . . .	1920	Stiles, J. A. . . . .	1907
Snaith, W. . . . .	1907	Stitt, J. B. . . . .	1915
Sneath, R. G. . . . .	1911	Stiver, J. L. . . . .	1907
Snider, A. M. . . . .	1917	St. Lawrence, J. . . . .	1908
Snow, G. B. . . . .	1919	Stock, J. J. . . . .	1908
Soehner, H. C. . . . .	1920	Stock, P. H. . . . .	1909
Somers, N. L. . . . .	1914	Stocking, F. T. . . . .	1895
Soper, R. W. (deceased)	1913	Stone, J. D. . . . .	1915
Sparling, M. W. . . . .	1909	Stone, L. I. . . . .	1910
Speirs, R. M. . . . .	1917	Stoneman, E. C. R. . . . .	1914
Speller, F. N. . . . .	1893	Storey, G. C. . . . .	1915
Spellman, W. A. . . . .	1913	Storms, D. H. . . . .	1920
Spence, J. J. . . . .	1909	Story, R. A. . . . .	1911
Spencer, A. C. . . . .	1907	Strathy, J. M. (deceased)	1913
Spotton, A. K. . . . .	1894	Strathearn, D. K. C. . . . .	1919
Spry, R. J. . . . .	1910	Street, J. C. . . . .	1909
Squire, G. E. . . . .	1911	Strome, I. R. . . . .	1914
Squire, R. H. (deceased)	1893	Stroud, J. E. C. . . . .	1915
Stamford, W. L. . . . .	1908	Stroud, S. . . . .	1909
Standing, R. O. . . . .	1914	Stuart, H. B. . . . .	1908
Stark, W. H. . . . .	1916	Stuart, J. L. G. . . . .	1907-1908
Starr, R. H. . . . .	1908	Stubbs, W. F. . . . .	1905
Stayner, D. S. . . . .	1909	Stull, W. W. . . . .	1897
Steel, W. A. . . . .	1915	Sturdy, N. H. . . . .	1905
Steele, I. J. . . . .	1902	Suhler, A. N. . . . .	1915
Steele, A. L. . . . .	1910	Summers, G. F. . . . .	1907
Steele, W. S. (deceased)	1911	Sureda, J. A. . . . .	1916
Stephenson, G. E. . . . .	1920	Sutcliffe, H. W. . . . .	1907
Stern, E. W. . . . .	1884	Sutherland, A. L. . . . .	1910
Steven, H. M. . . . .	1910	Sutherland, C. C. . . . .	1909
Stevenson, W. H. . . . .	1901	Sutherland, D. . . . .	1913
Stewart, A. E. . . . .	1911	Sutherland, W. H. . . . .	1902
Stewart, A. L. . . . .	1920	Swan, A. W. . . . .	1917
Stewart, J. A. . . . .	1898	Swan, R. G. . . . .	1909
Stewart, D. L. N. . . . .	1905	Swan, W. G. . . . .	1905
Stewart, M. A. . . . .	1905	Swinnerton, A. A. . . . .	1919
Stewart, R. B. . . . .	1909	Sword, A. D. . . . .	1908-1909
Stewart, R. O. . . . .	1911	Sykes, F. H. . . . .	1905
Stewart, W. M. . . . .	1906	Symmes, H. D. (deceased)	1891
Stewart, G. S. . . . .	1907	Szammers, C. F. . . . .	1911

**T**

Tackaberry, S. G. . . . .	1914	Tennant, D. C. . . . .	1899
Tasker, R. . . . .	1913	Tennant, W. C. (deceased)	1900
Tate, H. W. . . . .	1909	Tennent, E. H. . . . .	1914
Taylor, A. . . . .	1900	Tennyson, A. L. . . . .	1919
Taylor, A. N. . . . .	1915	Ternan, E. A. . . . .	1910
Taylor, J. W. R. . . . .	1908	Thom, W. H. . . . .	1910
Taylor, J. S. (deceased)	1914	Thomas, A. M. . . . .	1919
Taylor, R. . . . .	1911	Thomas, G. C. . . . .	1911
Taylor, T. . . . .	1902	Thomas, V. C. . . . .	1908
Taylor, W. E. . . . .	1908	Thompson, J. M. . . . .	1913
Taylor, W. V. . . . .	1893	Thompson, P. M. . . . .	1907
Teasdale, C. M. . . . .	1902	Thompson, E. A. . . . .	1909
Temes, C. N. . . . .	1914	Thompson, H. B. . . . .	1910
Temple, J. B. . . . .	1911	Thompson, R. M. A. . . . .	1910

Thompson, W. K.	1913	Torrance, T. E.	1913
Thomson, A. P.	1917	Tough, W. G. (deceased)	1911
Thomson, D. J.	1913	Townsend, C. J.	1904
Thomson, T. K.	1886	Townsend, D. T.	1904
Thomson, R. W.	1892	Traill, J. J.	1905
Thomson, S. E.	1904	Treadgold, W. M.	1905
Thomson, L. R.	1905-1907	Trees, S. L.	1903
Thomson, J. E.	1906	Trees, A. G.	1909
Thomson, O. R.	1907	Treloar, G. E.	1914
Thorne, S. M.	1900	Tremaine, R. C. C. (deceased)	1895
Thornley, J. H.	1908	Tremayne, J. E.	1916
Thorold, F. W.	1900	Trimble, A. V.	1904
Tillson, L. B.	1915	Trow, R. M.	1913
Tillson, E. D.	1905	Tucker, B. B.	1904
Tillson, G. D.	1915	Tufford, A. A.	1917
Tilston, C. E.	1917	Tull, W. S.	1914
Tilston, J. A.	1914	Turnbull, W. G.	1909
Tipper, G. A.	1909	Turnbull, A. G.	1920
Titus, C. G.	1910	Turner, W. E.	1905
Titus, O. W.	1917	Tuttle, H. A.	1917
Tom, J. A.	1915	Twidale, E. A. (deceased)	1914
Tomlinson, B. C.	1917	Tye, H. W.	1908
Toms, C. G.	1908	Tyrrell, E. J.	1917
Topping, V.	1917	Tyrrell, J. W.	1883
Torrance, R. D.	1911	Tyrrell, H. G.	1886

**U**

Uffelmann, W.	1915	Ure, D. G.	1920
Umbach, J. E.	1903	Ure, W. G.	1913
Underwood, J. E.	1909	Uren, A. E.	1905

**V**

Van Allen, K. M. (deceased)	1910	Venney, L. T.	1910
VanDyke, F. T.	1914	Vercoe, H. L.	1898
VanEvery, W. W.	1899	Verity, M. F.	1914
VanNorman, C. P.	1908-1909	Vickers, N. (deceased)	1911
VanNostrand, J.	1909	Vickery, C. L. (deceased)	1906
Vatcher, A.	1909	Villeneuve, T. L.	1908
Vaughan, J. M.	1905	Von Gunten, C. F.	1913
Vaughan, O. D.	1920		

**W**

Waddell, H. O.	1914	Wanless, A. A.	1902
Wade, E.	1904	Ward, A. L.	1915
Wagner, H. W.	1914	Ward, F. W.	1916
Wagner, N.	1910	Ward, R. C.	1916
Wagner, W. E.	1899	Wardell, A.	1911
Wagner, H. L.	1905	Warrington, G. A.	1910
Wait, G. E.	1920	Washington, H. A.	1920
Waite, J. H. C.	1911	Wass, S. B.	1903
Walcott, W. D.	1911	Waters, D. M.	1920
Waldron, J.	1903	Watson, F. E.	1911
Walker, E. W. (deceased)	1904	Watson, H. R.	1917
Walker, R. M.	1910	Watson, J. M.	1920
Walker, W. J.	1907	Watson, J. P.	1904
Walker, J. A.	1908	Watson, L. T.	1920
Walker, C. M.	1909	Watson, M. B.	1910
Wallace, G. L.	1911	Watson, R. B. (deceased)	1893
Wallace, H. D. M. (deceased)	1914	Watt, G. H.	1899
Walton, T. (deceased)	1910	Watts, R. E. (deceased)	1913

Waugh, B.	1908	Williams, J. A. McK.	1909
Webb, C. E.	1909	Williams, J. N.	1915
Webb, E. E.	1909	Williams, G. K. (deceased)	1910
Webster, C. A.	1913	Williamson, D. A.	1898
Webster, H.	1913	Williamson, O. T. G.	1909
Wedlake, R. M.	1908	Willmott, L. E.	1920
Weeks, M. B.	1897	Willson, R. D. (deceased)	1901
Weicker, J. J.	1920	Wilson, A. C.	1914
Weir, D. H.	1913	Wilson, A. F.	1907
Weir, F. E.	1915	Wilson, F. D.	1908
Weir, H. M.	1900	Wilson, F. F.	1909
Weir, J. M.	1904	Wilson, H. A.	1911
Weir M. L.	1920	Wilson, H. P.	1914
Weir, R. P.	1908	Wilson, J. C.	1915
Weldon, E. A.	1897	Wilson, J. N.	1906
Welford, P. G.	1911	Wilson, J. M.	1908
Wells, A. F.	1904	Wilson, J. S.	1920
Wells, A. R.	1916	Wilson, L. R.	1909
Wéppler, H. S.	1916	Wilson, N. D.	1903
West, A. M.	1908	Wilson, W. H.	1910
West, C. W.	1915	Wing, D. O.	1908
Whaley, A. B.	1920	Winters, W. S.	1913
Wheler, A. G.	1911	Withrow, W. J. (deceased)	1890
Whelihan, J. A.	1903	Withrow, F. D.	1900
White, A. H. V.	1892	Wood, C. S.	1911
White, F.	1903	Wood, E. M.	1906
White, W. R.	1908	Wood, G.	1917
White W. J.	1908	Wood, H. A.	1915
White, F. C.	1909	Wood, R. F. B.	1913
White, H. M.	1910	Woodley, G. E. (deceased)	1910
Whitelaw, A. R.	1909	Woods, M. H.	1907
Whitley, P. L.	1914	Wookey, S. A.	1909
Whitside, J. L. (deceased)	1910	Woonton, W. G.	1918
Wickens, W. S.	1910	Worden, W. G.	1911
Wickett, T.	1889	Workman, G. R.	1910
Wickett, W. F. (deceased)	1906	Worthington, W. R.	1904
Widdicombe, A. E. (deceased)	1916	Wright, A. J.	1913
Wiggins, T. H.	1890	Wright, C. H. C.	1888
Wigle, A. E.	1914	Wright, G. W. A.	1907
Wigle, J. A. H.	1914	Wright, I. A.	1910
Wilcock, W. S.	1920	Wright, R. T.	1894
Wilkes, E. D.	1907	Wright, W. F.	1904
Wilkes, G. H.	1911	Wright, W. J. T.	1911
Wilkinson, T. A.	1898	Wrong, F. H.	1911
Wilkinson, R. G.	1909	Wylie, W. H.	1911
Williams, C. G.	1903	Wyman, H. K.	1911-1915
Williams, E. R.	1911		

**Y**

Yeates, E.	1899	Young, J.	1907
Yorke, L. P.	1911	Young, R.	1908
Youell, A. W. (deceased)	1910	Young, R. B.	1913
Youell, L. L.	1920	Young, R. W.	1914
Young, A.	1911	Young, S.	1911
Young, C. R.	1903	Young, W. S.	1910
Young, H. G.	1920	Young, W. H.	1905

**Z**

Zahn, H. J.	1902	Zinkan, W. E.	1911
Zimmer, A. R.	1907		

# UNIVERSITY OF TORONTO



## CALENDAR OF THE FACULTY OF APPLIED SCIENCE AND ENGINEERING 1922-1923



## CONTENTS

	PAGE
CALENDAR.....	5
FACULTY LISTS.....	7
HISTORICAL SKETCH.....	13
MATRICULATION.....	14
ADMISSION.....	14
DEGREES.....	15
FEES.....	16, 17
SCHOLARSHIPS.....	18
SCHOOL OF ENGINEERING RESEARCH.....	18, 19
REGULATIONS RESPECTING EXAMINATIONS.....	19
VACATION WORK, SHOP WORK, ETC.....	20, 21
REGULATIONS RESPECTING TERM WORK.....	22
INFORMATION FOR STUDENTS.....	23
DEPARTMENT OF CIVIL ENGINEERING.....	26
"        MINING ENGINEERING.....	31
"        MECHANICAL ENGINEERING.....	34
"        ARCHITECTURE.....	37
"        CHEMICAL ENGINEERING.....	40
"        ELECTRICAL ENGINEERING.....	43
"        METALLURGICAL ENGINEERING.....	46
OUTLINE OF LECTURE AND LABORATORY COURSES.....	48
LABORATORY EQUIPMENT.....	90
LIBRARY.....	102
ROYAL ONTARIO MUSEUM.....	102
ENGINEERING AND AFFILIATED SOCIETIES.....	104
LODGING AND BOARD, RESIDENCES.....	108
SUMMARY OF STUDENTS IN ATTENDANCE.....	109

1922

## CALENDAR

1922

JANUARY		FEBRUARY		MARCH		APRIL	
Sun. . . 1 8 15 22 29		Sun. . . 5 12 19 26		Sun. . . 5 12 19 26		Sun. . . 2 9 16 23 30	
Mon. . . 2 9 16 23 30		Mon. . . 6 13 20 27		Mon. . . 6 13 20 27		Mon. . . 3 10 17 24 ..	
Tues. . . 3 10 17 24 31		Tues. . . 7 14 21 28		Tues. . . 7 14 21 28		Tues. . . 4 11 18 25 ..	
Wed. . . 4 11 18 25 ..		Wed. . . 1 8 15 22 ..		Wed. . . 1 8 15 22 ..		Wed. . . 5 12 19 26 ..	
Thur. . . 5 12 19 26 ..		Thur. . . 2 9 16 23 ..		Thur. . . 2 9 16 23 30		Thur. . . 6 13 20 27 ..	
Fri. . . 6 13 20 27 ..		Fri. . . 3 10 17 24 ..		Fri. . . 3 10 17 24 31		Fri. . . 7 14 21 28 ..	
Sat. . . 7 14 21 28 ..		Sat. . . 4 11 18 25 ..		Sat. . . 4 11 18 25 ..		Sat. . . 1 8 15 22 29 ..	
MAY		JUNE		JULY		AUGUST	
Sun. . . 7 14 21 28		Sun. . . 4 11 18 25		Sun. . . 2 9 16 23 30		Sun. . . 6 13 20 27	
Mon. . . 8 15 22 29		Mon. . . 5 12 19 26		Mon. . . 3 10 17 24 31		Mon. . . 7 14 21 28	
Tues. . . 2 9 16 23 30		Tues. . . 6 13 20 27		Tues. . . 4 11 18 25 ..		Tues. . . 8 15 22 29	
Wed. . . 3 10 17 24 31		Wed. . . 7 14 21 28		Wed. . . 5 12 19 26 ..		Wed. . . 2 9 16 23 30	
Thur. . . 4 11 18 25 ..		Thur. . . 1 8 15 22 29		Thur. . . 6 13 20 27 ..		Thur. . . 3 10 17 24 31	
Fri. . . 5 12 19 26 ..		Fri. . . 2 9 16 23 30		Fri. . . 7 14 21 28 ..		Fri. . . 4 11 18 25 ..	
Sat. . . 6 13 20 27 ..		Sat. . . 3 10 17 24 ..		Sat. . . 1 8 15 22 29 ..		Sat. . . 5 12 19 26 ..	
SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
Sun. . . 3 10 17 24		Sun. . . 1 8 15 22 29		Sun. . . 5 12 19 26		Sun. . . 3 10 17 24 31	
Mon. . . 4 11 18 25		Mon. . . 2 9 16 23 30		Mon. . . 6 13 20 27		Mon. . . 4 11 18 25 ..	
Tues. . . 5 12 19 26		Tues. . . 3 10 17 24 31		Tues. . . 7 14 21 28		Tues. . . 5 12 19 26 ..	
Wed. . . 6 13 20 27		Wed. . . 4 11 18 25 ..		Wed. . . 8 15 22 29		Wed. . . 6 13 20 27 ..	
Thur. . . 7 14 21 28		Thur. . . 5 12 19 26 ..		Thur. . . 2 9 16 23 30		Thur. . . 7 14 21 28 ..	
Fri. . . 8 15 22 29		Fri. . . 6 13 20 27 ..		Fri. . . 3 10 17 24 ..		Fri. . . 8 15 22 29 ..	
Sat. . . 9 16 23 30		Sat. . . 7 14 21 28 ..		Sat. . . 4 11 18 25 ..		Sat. . . 2 9 16 23 30 ..	

1923

## CALENDAR

1923

JANUARY		FEBRUARY		MARCH		APRIL	
Sun. . . 7 14 21 28		Sun. . . 4 11 18 25		Sun. . . 4 11 18 25		Sun. . . 1 8 15 22 29	
Mon. . . 8 15 22 29		Mon. . . 5 12 19 26		Mon. . . 5 12 19 26		Mon. . . 2 9 16 23 30	
Tues. . . 2 9 16 23 30		Tues. . . 6 13 20 27		Tues. . . 6 13 20 27		Tues. . . 3 10 17 24 ..	
Wed. . . 3 10 17 24 31		Wed. . . 7 14 21 28		Wed. . . 7 14 21 28		Wed. . . 4 11 18 25 ..	
Thur. . . 4 11 18 25 ..		Thur. . . 1 8 15 22 ..		Thur. . . 8 15 22 29		Thur. . . 5 12 19 26 ..	
Fri. . . 5 12 19 26 ..		Fri. . . 2 9 16 23 ..		Fri. . . 2 9 16 23 30		Fri. . . 6 13 20 27 ..	
Sat. . . 6 13 20 27 ..		Sat. . . 3 10 17 24 ..		Sat. . . 3 10 17 24 31		Sat. . . 7 14 21 28 ..	
MAY		JUNE		JULY		AUGUST	
Sun. . . 6 13 20 27		Sun. . . 3 10 17 24 ..		Sun. . . 1 8 15 22 29		Sun. . . 5 12 19 26	
Mon. . . 7 14 21 28		Mon. . . 4 11 18 25 ..		Mon. . . 2 9 16 23 30		Mon. . . 6 13 20 27	
Tues. . . 8 15 22 29		Tues. . . 5 12 19 26 ..		Tues. . . 3 10 17 24 31		Tues. . . 7 14 21 28	
Wed. . . 9 16 23 30		Wed. . . 6 13 20 27 ..		Wed. . . 4 11 18 25 ..		Wed. . . 8 15 22 29	
Thur. . . 10 17 24 31		Thur. . . 7 14 21 28 ..		Thur. . . 5 12 19 26 ..		Thur. . . 2 9 16 23 30	
Fri. . . 11 18 25 ..		Fri. . . 8 15 22 29 ..		Fri. . . 6 13 20 27 ..		Fri. . . 3 10 17 24 31	
Sat. . . 12 19 26 ..		Sat. . . 9 16 23 30 ..		Sat. . . 7 14 21 28 ..		Sat. . . 4 11 18 25 ..	
SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
Sun. . . 2 9 16 23 30		Sun. . . 7 14 21 28		Sun. . . 4 11 18 25		Sun. . . 2 9 16 23 30	
Mon. . . 3 10 17 24 ..		Mon. . . 1 8 15 22 29		Mon. . . 5 12 19 26		Mon. . . 3 10 17 24 31	
Tues. . . 4 11 18 25 ..		Tues. . . 2 9 16 23 30		Tues. . . 6 13 20 27		Tues. . . 4 11 18 25 ..	
Wed. . . 5 12 19 26 ..		Wed. . . 3 10 17 24 31		Wed. . . 7 14 21 28 ..		Wed. . . 5 12 19 26 ..	
Thur. . . 6 13 20 27 ..		Thur. . . 4 11 18 25 ..		Thur. . . 8 15 22 29		Thur. . . 6 13 20 27 ..	
Fri. . . 7 14 21 28 ..		Fri. . . 5 12 19 26 ..		Fri. . . 2 9 16 23 30		Fri. . . 7 14 21 28 ..	
Sat. . . 8 15 22 29 ..		Sat. . . 6 13 20 27 ..		Sat. . . 3 10 17 24 ..		Sat. . . 1 8 15 22 29 ..	

## CALENDAR 1922-1923

- 1922—July 1 Saturday.....Dominion Day, University Buildings closed.
- Aug. 19 Saturday.....Students Third Year, Dept. 1, report at Gull Lake Camp.
- Sept. 1 Friday.....Last day for receiving applications for supplemental examinations.
- Sept. 2 Saturday.....Students Third Year, Dept. 2, report at Gull Lake Camp.
- Sept. 4 Monday.....Labour Day, University Buildings closed.
- Sept. 25 Monday.....Meeting of Faculty Council.  
Registration for First and Second Years.
- Sept. 26 Tuesday .....Academic Year begins at 9.00 a.m.  
Registration for Third and Fourth Years.  
Last Day for handing in Construction Notes.
- Sept. 26 Tuesday.....The opening address by the President to students of all the Faculties at 3 p.m. in Convocation Hall.
- Sept. 27 Wednesday....Lectures and Laboratory Work begin.
- Oct. 6 Friday.....Meeting of Faculty Council.
- Oct. 7 Saturday.....Stated meeting of the Caput to deal with requests as to social functions until November 15th.
- Oct. 11 Wednesday....Interfaculty Track Meet. University Buildings closed after 1 p.m.
- Oct. 13 Friday.....Meeting of Senate.
- Nov. 3 Friday.....Meeting of Faculty Council.
- Nov. 10 Friday.....Meeting of Senate.
- Dec. 1 Friday.....Meeting of Faculty Council.
- Dec. 8 Friday.....Meeting of Senate.
- Dec. 22 Friday.....Last day of Lectures. Term ends at 12 noon.
- Dec. 25 Monday.....University Buildings closed.
- 1923—Jan. 1 Monday.....University Buildings closed.
- Jan. 9 Tuesday.....Easter Term begins; lectures commence at 9.00 a.m.
- Jan. 10 Wednesday....Assembly of the students of all Faculties in Convocation Hall at 12.10 p.m.
- Jan. 12 Friday.....Meeting of Senate.
- Feb. 2 Friday.....Meeting of Faculty Council.
- Feb. 9 Friday.....Meeting of Senate.
- Feb. 14 Wednesday....Ash Wednesday.
- Mar. 2 Friday.....Meeting of Faculty Council.

1923—Mar. 9 Friday..... Meeting of Senate.  
Mar. 9 Friday..... Annual elections of Engineering Society.  
Mar. 29 Thursday ... Second Term ends.  
Mar. 30 Friday..... Good Friday, University Buildings closed.  
Apr. 5 Thursday ..... Annual Examinations begin.  
Apr. 6 Friday..... Meeting of Faculty Council.  
May 4 Friday..... Meeting of Faculty Council.  
May 11 Friday..... Meeting of Senate.  
May 24 Thursday..... University Buildings closed.  
June 6 Wednesday.... Meeting of Senate.  
June 8 Friday..... University Commencement.

# UNIVERSITY OF TORONTO

## FACULTY OF APPLIED SCIENCE AND ENGINEERING.

<i>President</i> .....	SIR ROBERT A. FALCONER, K.C.M.G., LL.D., D.Litt.
<i>Dean of Faculty</i> ...	BRIG.-GENERAL C. H. MITCHELL, C.B., C.M.G., C.E., LL.D., D.Eng.
<i>Secretary of Faculty</i> .....	S. G. BENNETT, M.C., B.A.Sc.
<i>Bursar</i> .....	F. A. MOURÉ, Esq.
E. A. ALLCUT, M.Sc., Mem. A.S.M.E.	208 Dundas St. E.
<i>Associate Professor of Thermodynamics.</i>	
G. R. ANDERSON, M.A.,	72 Isabella St.
<i>Associate Professor of Engineering Physics.</i>	
R. W. ANGUS, B.A.Sc., Mem. A.S.M.E.,	42 Howland Ave.
<i>Professor of Mechanical Engineering.</i>	
E. G. R. ARDAGH, B.A.Sc.,	Dovercourt Apartments
<i>Associate Professor of Chemical Engineering.</i>	
J. W. BAIN, B.A.Sc., F.I.C.,	393 Brunswick Ave.
<i>Professor of Chemical Engineering.</i>	
ADRIAN BERRINGTON, M.S.A. (London),	University of Toronto
<i>Associate Professor of Architecture.</i>	
M. C. BOSWELL, M.A., Ph.D.,	University of Toronto
<i>Associate Professor of Organic Chemistry.</i>	
J. R. COCKBURN, M.C., B.A.Sc., M.E.I.C.,	100 Walmer Road
<i>Associate Professor of Descriptive Geometry.</i>	
S. R. CRERAR, B.A.Sc., D.L.S.	122 Grenadier Road
<i>Assistant Professor of Surveying.</i>	
F. C. DYER, B.A.Sc.,	233 Ashworth Ave.
<i>Assistant Professor of Mining Engineering.</i>	
P. GILLESPIE, M.Sc., C.E., M.E.I.C.,	111 Farnham Ave.
<i>Professor of Civil Engineering.</i>	
G. A. GUESS, M.A.,	Oakville, Ont.
<i>Professor of Metallurgy.</i>	
H. E. T. HAULTAIN, C.E., M.I.M.M.,	50 St. George St.
<i>Professor of Mining Engineering.</i>	
J. T. KING, B.A.Sc.,	126 Manor Road
<i>Assistant Professor of Mining Engineering.</i>	
A. T. LAING, B.A.Sc.,	146 Balmoral Ave.
<i>Associate Professor of Applied Mechanics.</i>	
T. R. LOUDON, B.A.Sc., M.E.I.C.,	189 Sheldrake Blvd.
<i>Associate Professor of Applied Mechanics.</i>	
A. W. McCONNELL, B.A.Sc., M.R.A.I.C.,	36 Prince Arthur Ave.
<i>Associate Professor of Architecture.</i>	

J. McGOWAN, B.A., B.A.Sc., <i>Professor of Applied Mechanics.</i>	Electrical Bldg.
J. H. PARKIN, B.A.Sc., M.E., <i>Assistant Professor of Mechanical Engineering.</i>	10 Columbine Ave.
H. W. PRICE, B.A.Sc., <i>Professor of Electrical Engineering.</i>	474 Palmerston Blvd.
T. R. ROSEBRUGH, M.A., <i>Professor of Electrical Engineering.</i>	92 Walmer Road
W. J. SMITHER, B.A.Sc., <i>Assistant Professor of Structural Engineering.</i>	40 Wellesley St.
L. B. STEWART, O.L.S., D.T.S., <i>Professor of Surveying and Geodesy.</i>	17 Admiral Road
W. M. TREADGOLD, B.A., <i>Associate Professor of Surveying.</i>	13 Woodlawn Ave. East
C. H. C. WRIGHT, B.A.Sc., M.R.A.I.C., <i>Professor of Architecture.</i>	419 Markham St.
C. R. YOUNG, B.A.Sc., C.E., M.E.I.C., <i>Associate Professor of Structural Engineering.</i>	98 Hilton Ave.
A. R. ZIMMER, B.A.Sc., <i>Assistant Professor of Electrical Engineering.</i>	80 Pine Crest Road

## SESSIONAL APPOINTMENTS.

C. G. R. ARMSTRONG, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	350 Montrose Ave.
E. W. BANTING, B.A.Sc. <i>Lecturer in Surveying.</i>	330 St. George St.
S. G. BENNETT, M.C., B.A.Sc., <i>Lecturer in Commercial Engineering.</i>	Mining Bldg.
H. S. BROWN, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	Lansing, Ont.
FREDERICK COATES, A.R.C.A., <i>Instructor in Modelling.</i>	West Hill
S. K. CHENEY, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	127 Givens St.
H. C. CRANE, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	50 Simpson Ave.
J. H. CURZON, <i>Demonstrator in Engineering Drawing.</i>	Lynne and Warden Aves.
W. A. DANCEY, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	23 Surrey Place
W. B. DUNBAR, B.A.Sc., <i>Instructor in Engineering Drawing.</i>	26 Ozark Cres.
O. W. ELLIS, M.Sc., <i>Lecturer in Metallurgical Engineering.</i>	539 Church St.

FACULTY OF APPLIED SCIENCE AND ENGINEERING 9

J. E. FASKEN, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	661 Euclid Ave.
C. B. FERRIS, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	94 Sherwood Ave.
H. J. FRANKLIN, B.A.Sc., <i>Instructor in Engineering Drawing.</i>	72 Delaware Ave.
W. F. GREEN, M.A., <i>Demonstrator in Mining Engineering.</i>	717 Dovercourt Road
W. S. GUEST, B.A.Sc., <i>Lecturer in Electrical Engineering.</i>	30 McMaster Ave.
A. E. HAMILTON, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	4 Grandview Ave.
G. HEPBURN, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	49 Tranby Ave.
S. E. HENRY, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	64 St. George St.
O. W. HERZBERG, B.A., M.Sc. (McGill), <i>Demonstrator in Chemical Engineering.</i>	Hart House, U. of T.
U. C. HOLLAND, B.A.Sc., <i>Assistant in Machine Design.</i>	93 Pacific Ave.
T. F. HOWLETT, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	9 Page St.
C. A. HUGHES, B.A.Sc., <i>Demonstrator in Applied Mechanics.</i>	Mimico Beach
K. B. JACKSON, B.A.Sc., <i>Demonstrator in Engineering Physics.</i>	35 Grosvenor St.
C. W. JEFFERY, M.O.S.A., <i>Instructor in Freehand Drawing and Water Colour.</i>	York Mills
P. V. JERMYN, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	198 Robert St.
R. D. KEENLEYSIDE, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	78 College St.
MISS J. C. LAING, B.A., <i>Instructor in French.</i>	39 MacFarland Ave.
H. M. LANCASTER, B.A.Sc., <i>Special Lecturer in Sanitary Chemistry.</i>	Dept. Public Health
C. D. LOCKE, B.S., M.A., <i>Lecturer in Chemical Engineering.</i>	154 Grenadier Rd.
G. G. MACDONALD, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	88 Indian Grove
H. K. MACLEAN, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	49 Spencer Ave.
H. H. MADILL, B.A.Sc., M.R.A.I.C., <i>Lecturer in Architecture.</i>	169 Lauder Ave.
G. D. MAXWELL, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	233 Albany Ave.

10 UNIVERSITY OF TORONTO CALENDAR 1922-1923

J. W. MELSON, B.A.Sc., <i>Lecturer in Surveying.</i>	69 Walmsley Blvd.
E. L. PATERSON, B.A.Sc., <i>Demonstrator in Applied Mechanics.</i>	60 Sussex Ave.
J. T. RANSOM, B.A.Sc., D.L.S., <i>Demonstrator in Engineering Physics.</i>	171 Arlington Ave
W. L. SAGAR, B.A.Sc., <i>Demonstrator in Applied Mechanics..</i>	306 Jarvis St.
C. P. SALE, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	
T. P. G. SHAW, B.Sc., <i>Demonstrator in Chemical Engineering.</i>	49 Grenville St.
D. K. C. STRATHEARN, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	911 Dovercourt Road
R. TAYLOR, B.A.Sc., <i>Lecturer in Hydraulics.</i>	121 Carlton St.
F. R. TAYLOR, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	13 Boustead Ave.
A. L. TENNYSON, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	83 Grenville St.
J. E. TOOMER, B.S., <i>Lecturer in Metallurgical Engineering.</i>	132 Havelock St.
A. G. TURNBULL, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	51 Ann St.
H. A. TUTTLE, B.A.Sc., <i>Assistant in Mechanical Engineering.</i>	125 Bedford Road
A. WARDELL, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	4 Williamson Road
J. J. WEICKER, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	1449 Gerrard St. East
T. M. WEST, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	73 Homewood Ave.
A. C. WILSON, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	283 Evelyn Ave.
G. R. WORKMAN, <i>Demonstrator in Engineering Drawing.</i>	22 Helena Ave.
W. J. T. WRIGHT, B.A.Sc., <i>Lecturer in Engineering Drawing.</i>	126 Melrose Ave.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION TO  
STUDENTS IN APPLIED SCIENCE.

S. BEATTY, Ph.D., <i>Associate Professor of Mathematics.</i>	537 Markham St.
J. T. BURT-GERRANS, M.A., Phm.B., <i>Assistant Professor of Electrochemistry.</i>	46 Dewson St.
C. A. CHANT, M.A., Ph.D., <i>Professor of Astro-Physics.</i>	201 Madison Ave.
A. P. COLEMAN, M.A., Ph.D., F.R.S., <i>Professor of Geology.</i>	476 Huron St.
R. B. DEFRIES, M.D., <i>Assistant Professor of Hygiene.</i>	135 Collier St.
A. T. DELURY, M.A., <i>Professor of Mathematics.</i>	74 St. Albans St.
B. FAIRLEY, M.A., Ph.D., <i>Associate Professor of German.</i>	22 Kendal Ave.
J. H. FAULL, B.A., Ph.D., <i>Professor of Botany.</i>	102 Yorkville Ave.
C. R. FAY, M.A., D.Sc., <i>Professor of History of Economics.</i>	88 St. George St.
J. G. FITZGERALD, M.B., <i>Professor of Hygiene.</i>	186 Balmoral Ave.
F. B. KENRICK, M.A., Ph.D., <i>Professor of Chemistry.</i>	77 Lonsdale Road
W. J. LOUDON, B.A., <i>Professor of Mechanics.</i>	Cooksville, Ont.
A. MACLEAN, B.A., <i>Assistant Professor of Geology.</i>	22 Havelock St.
W. L. MILLER, B.A., Ph.D., <i>Professor of Physical Chemistry.</i>	8 Hawthorne Ave.
G. H. NEEDLER, B.A., Ph.D., <i>Professor of German.</i>	103 Bedford Road
W. A. PARKS, B.A., Ph.D., <i>Professor of Palaeontology.</i>	69 Albany Ave.
A. L. PARSONS, B.A., <i>Associate Professor of Mineralogy.</i>	72 Isabella St.
I. R. POUNDER, M.A., <i>Assistant Professor of Mathematics.</i>	19 Glen Gordon Road
L. J. ROGERS, B.A.Sc., <i>Assistant Professor of Analytical Chemistry.</i>	29 Rosemount Ave.,
J. L. SYNGE, B.A., <i>Assistant Professor of Mathematics.</i>	183 Huron St.

12 UNIVERSITY OF TORONTO CALENDAR 1922-1923

J. E. THOMSON, B.A.Sc., <i>Assistant Professor of Mineralogy.</i>	57 Queen's Park
E. M. WALKER, B.A., M.B., <i>Associate Professor of Biology.</i>	67 Alcina Ave.
T. L. WALKER, M.A., Ph.D., <i>Professor of Mineralogy.</i>	20 Avondale Ave.

SESSIONAL APPOINTMENTS.

G. C. PATTERSON, B.A., <i>Lecturer in Spanish.</i>	342 Berkley St.
MISS M. E. G. WADDELL, M.A., <i>Tutor in Mathematics.</i>	32 Madison Ave.

## FACULTY OF APPLIED SCIENCE AND ENGINEERING.

### HISTORICAL SKETCH.

The Legislative Assembly during the Session of 1877 gave its sanction to the establishment of a School of Practical Science on the basis proposed in the memorandum of the Minister of Education confirmed by the Lieutenant-Governor in Council on the 3rd day of February, 1877.

By the scheme thus approved of, Government effected an arrangement with the Council of University College whereby the students of the School of Practical Science enjoyed full advantage of the instruction given by its professors and lecturers in all the departments of science which were embraced in the work of the School.

This arrangement was brought to an end in 1889 by the transfer of the department of science above referred to, from University College to the University of Toronto under the operation of the University Federation Act.

In order that the students of the School might continue to enjoy the advantage of the instruction of the above departments, the Senate of the University of Toronto passed a Statute in October, 1889, affiliating the School to the University, which Statute was confirmed by the Lieutenant-Governor on the 30th day of October, 1889.

By an Order-in-Council approved by the Lieutenant-Governor, on the 6th day of November, 1889, a Principal was appointed, and the management of the School was entrusted to a council composed of the Principal as chairman, and the Professors, Lecturers and Demonstrators appointed on the Teaching Faculty of the School.

By the terms of this order the management and discipline of the School was vested in the Council.

By a Statute of the Senate of the University of Toronto, passed on December 14th, 1900, the teaching staff and examiners of the School of Practical Science, together with the examiners for the degree of B.A.Sc., and professional degrees in Engineering, were constituted ex-officio the Faculty of Applied Science and Engineering of the University of Toronto.

By an Order-in-Council dated the 30th day of January, 1903, the Council<sup>1</sup> of the School was made to consist of the Principal, the Professors and Lecturers, together with the Registrar.

By the University Act, 1906, the School of Practical Science was united to the University of Toronto as its Faculty of Applied Science and Engineering.

### MATRICULATION.

A candidate for admission to the First Year in the Faculty of Applied Science and Engineering must produce satisfactory certificates of good character and of having completed the seventeenth year of his age on or before the first of October of the year in which he proposes to register.

He must also present certificates giving him credit in the following subjects of Pass and Honour Matriculation:

#### PASS MATRICULATION.

**ENGLISH** (Literature and Composition).

**HISTORY** (British and Ancient).

**MATHEMATICS** (Algebra and Geometry).

Any three of:

LATIN (Authors and Composition).

GREEK (Authors and Composition).

FRENCH (Authors and Composition).

SPANISH (Authors and Composition).

EXPERIMENTAL SCIENCE (Physics and Chemistry).

#### HONOUR MATRICULATION.

(At least 50%).

**ENGLISH** (Literature and Composition).

**MATHEMATICS** (Algebra, Geometry and Trigonometry).

One of:

LATIN (Authors and Composition).

GREEK (Authors and Composition).

FRENCH (Authors and Composition).

GERMAN (Authors and Composition).

SPANISH (Authors and Composition).

In selecting the options it is recommended that students take French, German and Experimental Science. In the Department of Architecture, French is required, in the Departments of Chemical Engineering and Mechanical Engineering it is desirable that students take German.

The regulations respecting Matriculation, together with a schedule of examinations which may be accepted as equivalent, may be found in the curriculum for matriculation on application to the Registrar of the University.

### ADMISSION.

A candidate for admission must have completed the seventeenth year of his age on or before the first of October of the year in which he seeks to enter.

Applications for admission must be made on blank forms supplied by the Registrar, and should be forwarded as early as possible to the Registrar of the University, together with all Pass and Honour Matriculation or equivalent certificates.

Applications will be considered from (a) those who have completed the pass and honour matriculation requirements, including those who hold, certificates recognized as equivalent—see matriculation curriculum—(b) those who have failed in not more than two papers of the pass matriculation examination. The latter must complete matriculation before being eligible to enter the second year.

Applications based upon other certificates than those mentioned will be considered as occasion may require. Such certificates must be accompanied by an official statement of the marks in the various subjects upon which the certificate was granted.

#### ADMISSION AD EUNDM STATUM.

An undergraduate of another University may be admitted *ad eundem statum* on such conditions as the Senate on the recommendation of the Council of the Faculty may prescribe.

An applicant for admission *ad eundem statum* must submit with his petition (1) a calendar of his University giving a full statement of the courses of instruction; (2) an official certificate of character and academic standing.

#### ENQUIRIES.

Enquiries with reference to requirements of admission to the Faculty of Applied Science and Engineering are to be addressed to the Registrar of the University.

Communications relating to curricula, instruction, examinations and standing therein, in the Faculty of Applied Science and Engineering are to be addressed to the Secretary of the Faculty.

#### DEGREES

*Degree of Bachelor of Applied Science (B.A.Sc.).*

*Degree of Bachelor of Architecture (B.Arch.).*

There are six graduating Departments leading to the Degree of Bachelor of Applied Science (B.A.Sc.) and one graduating Department leading to the Degree of Bachelor of Architecture (B.Arch.).

1. Civil Engineering.
2. Mining Engineering.
3. Mechanical Engineering.
- \* 4. Architecture.
5. Discontinued.
6. Chemical Engineering.
7. Electrical Engineering.
8. Metallurgical Engineering.

\* Note: *Degree of Bachelor of Architecture (B. Arch.) first conferred in May, 1923,*

The instruction in the Departments leading to the Degree of B.A.Sc. extends over a period of four years and is designed to give the students a thorough knowledge of the scientific principles in the several professions and also such training as will make him immediately useful when he commences professional work.

The instruction in the Department of Architecture leading to the Degree of B.Arch. extends over a period of four years and is designed to give the students a thorough knowledge of the aesthetic and scientific principles underlying the practice of the Architectural profession and also such other training as may make him immediately useful on commencing professional work.

*Degree of Master of Applied Science (M.A.Sc.).*

Graduates holding the Degree of B.A.Sc. of this University or those holding the degree of another University recognized as equivalent, may take post-graduate work proceeding to the Degree of Master of Applied Science (M.A.Sc.).

(For requirements, see page 87).

*Degree of Master of Architecture (M.Arch.).*

Graduates holding the Degree of B.Arch. or B.A.Sc. in Architecture of this University, or those holding the Degree of another University recognized as equivalent, may take post-graduate work proceeding to the Degree of Master of Architecture (M.Arch.).

(For requirements, see p. 88).

*Professional Degrees.*

Graduates in Applied Science and Engineering, and graduates of the School of Practical Science, may, after three years spent in professional work, present themselves for the degrees of Civil Engineer (C.E.), Mining. Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem. E.), as the case may be, subject to the rules and regulations established by the University. (see page 88).

**OPTIONS.**

In the fourth year, optional courses are arranged in certain departments. Students are required to submit their selection to the Secretary in writing, not later than September 15th. The proposed selection must be approved by Council before adoption.

**FEES.**

All fees are payable at the Bursar's office between the hours 10 a.m. and 1 p.m. of each week day except Saturday.

The annual fees including tuition, library, laboratory supplies and one annual examination for each year shall be as follows:

If paid in full on or before November 5th .....	\$150.00
---	----------

By instalments.

First instalment, if paid on or before November 5th .....	\$75.00
Second instalment, if paid on or before February 5th .....	78.00

#### REPEATING THE YEAR.

If paid in full on or before November 5th .....	\$75.00
---	---------

The above fees are payable in advance. After November 5th a penalty of \$1.00 per month will be imposed until the whole amount is paid. In the case of payment by instalments the same rule as to penalty will apply.

Students must have paid the fees due in the first term before proceeding to the work of the second term.

#### GENERAL FEES.

Matriculation, or registration of Matriculation .....	\$5.00
Supplemental examination .....	10.00
Admission <i>ad eundem statum</i> .....	10.00
Hart House .....	11.00
Degree of B.A.Sc. (payable not later than April 1st) .....	10.00
Degree of M.A.Sc. .....	25.00
Physical Training.....	5.00

#### DUES AND DEPOSITS

(Payable to the Secretary of the Faculty at the time of registration.)

Engineering Society membership .....	\$2.00
Athletic Association membership .....	1.00
Annual deposit, Departments 1, 3, 4, 7 .....	3.00
Departments 2, 6, 8 .....	8.00

Charges for waste, neglect and breakage are to be met out of the deposit fee, the balance of which will be refunded to the student at the end of the session on application to the Secretary.

If the foregoing deposits do not cover the cost of breakage due to carelessness or neglect, the balance shall be paid by the student to the Secretary and in default of such payment the results of his examination will be withheld.

#### HART HOUSE AND THE STUDENTS ADMINISTRATIVE COUNCIL

The annual fee.....	\$11.00
---------------------	---------

Every male student in attendance, proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering, is required to pay to the Bursar at the time of the entry of his name with the Secretary the annual fee of eleven dollars for the maintenance of Hart House and the Students' Administrative Council.

#### WOMEN STUDENTS ADMINISTRATIVE COUNCIL FEE

Every woman student proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering is required to pay to the Bursar at the time of the entry of her name with the Registrar the annual fee of three dollars for the maintenance of the Women Students' Administrative Council.

### PHYSICAL TRAINING FEE

Every male student in attendance proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering is required to pay to the Bursar the annual Physical Training fee of \$5.00 at the opening of each session in which Physical Training is compulsory for that student.

### SCHOLARSHIPS

#### BOILER INSPECTION AND INSURANCE COMPANY SCHOLARSHIP

The Boiler Inspection and Insurance Company of Canada offers a Scholarship in the Department of Mechanical Engineering of the value of \$130.00 to the student who obtains highest Honour Standing in the regular examinations of the third year.

The successful candidate will be expected to proceed to his fourth year during the session next following the date of the award.

The amount of the award will be credited by the Bursar to the fees of the fourth year of the successful candidate.

#### ONTARIO ASSOCIATION OF ARCHITECTS' ARCHITECTURAL SCHOLARSHIP

The Ontario Association of Architects offers a scholarship in the Department of Architecture of the value of \$100 to the student who has obtained the highest standard of general proficiency during the first year. This scholarship will be awarded annually in May, 1922 to 1926 inclusive.

#### TORONTO ARCHITECTURAL GUILD MEDAL

The Toronto Architectural Guild was the organization of local architects from which sprung the Ontario Association of Architects. When the new and wider association became firmly established, the Guild disbanded and handed over to a trustee board certain funds for the establishment of a Medal to be awarded in the Department of Architecture of the University of Toronto.

The Trustee Board, now that the fund has accumulated considerably, announces its intention of awarding this medal annually to a senior student showing outstanding ability in Architectural Design.

#### JUNIOR INSTRUCTORSHIPS

Provision is made for the seasonal appointment in various departments of graduates as Fellows or Demonstrators, whose duties shall consist of aiding in the work of instruction under the direction of the department concerned.

Applications for appointment should be made in writing to the Secretary of the Faculty not later than September 1st.

#### SCHOOL OF ENGINEERING RESEARCH

A School of Engineering Research, within the Faculty of Applied Science and Engineering was established in the Spring of 1917 at the suggestion of the late Dean Ellis.

The School is under the direct supervision of a Committee of Management composed of fifteen Members of the Faculty Council. To this Committee is entrusted the selection of researches to be undertaken under the auspices of the School, and the disposition of funds conducting them.

The School was organized chiefly for the training of graduates in methods of research, and for the carrying out of investigations. These latter may be problems relating to specific industries or raw materials and having a specific end in view, or general problems having to do with fundamental principles.

A number of research assistants are appointed annually in the various departments of the Faculty to carry on the work of research under direction of members of the staff. The facilities of the School are also open to graduates who desire to penetrate more deeply into particular phases of experimental work, or to undertake investigations either suggested by members of the staff or arising from their own work since graduation.

Address communications to the Secretary—Professor Maitland Boswell, Ph.D.

#### RESEARCH FELLOWSHIP

Regulations applying to students proceeding to the Degree of M.A.Sc. as a Research Fellow or as an Instructor on the teaching staff of this Faculty.

(1) No person in receipt of a salary exceeding \$600.00 for seven months' work under the School of Engineering Research shall be permitted to proceed to the degree of M.A.Sc.

(2) A person in receipt of a salary not exceeding \$600.00 for seven months under the School of Engineering Research and proceeding to the degree of M.A.Sc. shall be known as a Research Fellow.

(3) A person in receipt of a salary not exceeding \$800.00 for seven months' work as Instructor on the teaching staff may be allowed half his time for research work, in order that he may proceed to the degree of M.A.Sc., which shall not be granted in less than two years to such a candidate.

#### REGULATIONS RESPECTING EXAMINATIONS

##### REGULAR EXAMINATIONS

Promotions from one year to another are made on the results of the annual examinations. Students proceeding to a degree must pass all the examinations in the subjects of his or her course and at the periods arranged from time to time by the Council.

Candidates who fail in passing the annual examinations will be required to take again the whole course of instruction, both theoretical and practical, of the year in which they fail before presenting themselves a second time for examination. (This repetition includes vacation work.)

A student who in either term of the session fails to perform the work of his course in a manner satisfactory to the professors in charge, will not be allowed to present himself at the final examinations of the year.

In the second, third and fourth years annual examinations will be held at the beginning of the second term on all subjects completed during the first term.

No student will be allowed to write at the annual examinations who has not paid all fees and dues for which he is liable.

The pass marks required on written examinations is 40% and on practical examinations 60%.

Honours will be granted in each department to the students who obtain at least 50 per cent. in each subject, and 75 per cent. of the total number of marks allotted to the department at the annual examinations.

Honour Graduate standing will be granted to those who obtain honours in the final and in one previous year.

#### SUPPLEMENTAL EXAMINATIONS

A candidate who fails in one or two subjects at the Annual Examinations will be required to take supplemental examinations in such subjects.

The supplemental written examinations will begin on the 23rd of September, 1922. Candidates are required to send to the Secretary of the Faculty not later than the 1st of September, notice in writing of their intention to take such examinations, and to remit at the same time to the Bursar the fee of \$10.00. A penalty of \$1.00 will be imposed upon all candidates who fail to give notice within the time stated.

In the case where a candidate fails to pass a supplemental examination it will count as one of the two supplemental examinations which may be allowed him after the next annual examination.

#### VACATION WORK

Vacation work must be handed in on or before the first day of the session.

Vacation notes must be on construction only, and contain not less than twenty, nor more than thirty pages of sketches. These sketches must be freehand pencil drawings with figured dimensions.

Notes must be made in standard note books approved of by the Faculty. Notes which have been taken during the session in connection with the work in drawing will not count as vacation work.

The minimum percentage of marks required for practical work must be made in the case of vacation notes.

#### VACATION LETTERS

##### *Department of Mining Engineering*

THIRD YEAR STUDENTS:—Four letters to be written and mailed to the Professor of Mining Engineering, one each month, June, July, August and September; at least one letter must deal with a labour episode.

**FOURTH YEAR STUDENTS:**—The student may select either one of the following alternatives:—

- A. Four letters to be written and mailed, one each month, June, July, August and September; at least one letter to be on a labour episode: or
- B. One letter describing a labour episode to be written and mailed to the Professor of Mining Engineering not later than June 30th, and an article of suitable character and length for submitting to the Engineering Institute of Canada or the Canadian Mining Institute as a student's paper, to be written and mailed to the Professor of Mining Engineering not later than September 30th.

### FIELD EXPERIENCE

#### *Department of Mining Engineering*

The following are the regulations governing field experience certificates: Candidates for the degree in the Department of Mining Engineering will be required to present satisfactory evidence of having had at least six months' practical experience in work connected with mining, metallurgy or geology, for which they must have received regular wages.

The time may be spent on geological survey, in ore dressing, smelter or lixiviation works, in an assay office in the vicinity of mining or metallurgical works, on any work in or about a mine other than as an office man or clerk, or in prospecting. Not more than three months on geological surveys will be accepted, and prospecting will only count one-half (*i.e.*, four months' prospecting will be counted as two months) and must not be submitted for more than three of the six months.

In addition to the above, two months must be spent as office man or clerk.

Certificates must be made out, signed and countersigned and sent to the Secreatry of the Faculty of Applied Science and Engineering, who will retain them.

### SHOP WORK

#### *Departments of Mechanical and Electrical Engineering*

Students in Mechanical and in Electrical Engineering are not granted their degree until certificates have been submitted to the Council, and accepted as satisfactory, showing not less than eight months of mechanical experience in production under commercial conditions. Preferably the work undertaken should be in one of the manufacturing industries or trades with which the course is related.

It is not desirable that a student in these courses should enter the engineering industries without having acquired some experience in mechanical production and it is best to obtain this experience under commercial conditions, so that he can appreciate shop conditions and limitations.

### REGULATIONS RESPECTING TERM WORK

Students working in any laboratory must be governed by the regulations relating thereto as made known from time to time.

No laboratory reports or drawings may be removed from the laboratories without permission. The Council reserves the right to dispose of them as may be thought proper.

#### FIELD WORK

Field Work in Surveying of the First and Second Years will be taken on the University grounds, during the session.

The Field Work of the Third Year, for the session 1922-1923, will be taken previous to the session, during the months of August and September, 1922, at the University Survey Camp, situated on the shore of Gull Lake, and about five miles from the Village of Minden (Lot No. 9 in 13th Concession of the Township of Lutterworth). The camp may be reached by taking the train leaving Lindsay for Haliburton, and getting off at Gelert.

Students of the Third Year, Department 1, are expected to reach Gelert in the afternoon of August 19th, and those of Department 2, on September 2nd, when conveyances will meet them to take them to the camp. Personal effects must be limited to sixty pounds in weight, which must include two pairs of blankets, or their equivalent; beds and mattresses only will be provided.

No field notes will be counted which have not been taken in the field and during the hours allotted to such work.

Students taking practical astronomy are required to take observations in the field for time, latitude, and azimuth.

#### DRAFTING ROOMS

Drawings and briefs for same, that are required to be finished the first term of the session will not be counted unless finished in that term.

The minimum number of drawings in first and second years shall be twenty-five, and the maximum number thirty-five.

No drawings or briefs for same will be counted which have not been made in the drafting rooms, and during the hours allotted to such work.

#### THESES

In the Fourth Year each student is required to prepare a thesis on a subject approved by the Council. The title of the thesis must be sent to the Secretary of the Faculty for approval on or before November 1st, and the completed thesis must be handed in not later than the first day of the second term and shall become the property of the University. The rules governing size, form, etc., may be obtained on application to the Secretary.

#### EXEMPTIONS

Applications for exemption from any of the regulations must be made to the Council in writing and the particulars of the case fully stated.

### GENERAL INFORMATION FOR STUDENTS

The Council of University College and the governing bodies of the federated universities and colleges, respectively, have disciplinary jurisdiction over and entire responsibility for the conduct of their students in respect of all matters arising or occurring in or upon their respective college buildings and grounds, including residences.

The councils of such of the faculties as have assigned for their separate use any building or buildings and grounds, including residences, have disciplinary jurisdiction over and entire responsibility for the conduct of all students in their respective faculties in respect of all matters arising or occurring in or upon such building, or buildings and grounds.

In all such cases, and, save as aforesaid, as respects all students to whatsoever college or faculty they may belong, disciplinary jurisdiction is vested in the Caput, but the Caput may delegate its authority in any particular case or by any general regulation to the council or other governing body of the university or college or faculty to which the student belongs.

The Caput has also power and authority to determine by general regulations, or otherwise, to what college, faculty or other body the control of university associations belongs.

If there be any questions as to the proper body to exercise jurisdiction in any matter of discipline which may arise, the same shall be determined by the Caput, whose decision shall be final.

Disciplinary jurisdiction includes the power to impose fines.

Information as to the text-books, instruments and materials to be purchased by the students will be given on registration at the beginning of the session.

### REGULATIONS RESPECTING STUDENTS IN ATTENDANCE

No student will be enrolled in any year, or be allowed to continue in attendance, whose presence is deemed by the Council to be prejudicial to the interests of the University.

No student will be allowed to repeat the work of any year more than once.

Students proceeding regularly to the degree are required to attend the courses of instruction and the examinations in all subjects prescribed for students of their respective standing, and no student will be permitted to remain in the University who persistently neglects academic work.

Unless special permission is granted by the Council, a student who, at the close of two sessions in the University, has failed to secure standing in his year, will not be permitted registration in the Faculty of Applied Science and Engineering.

All interference on the part of any student with the personal liberty of another by arresting him, or summoning him to appear before any unauthorized tribunal of students, or otherwise subjecting him to any indignity or personal violence, is forbidden by the Caput.

A student who is under suspension, or who has been expelled from a

College or from the University, will not be admitted to the University buildings or grounds.

The constitution of every University society or association of students in the Faculty of Applied Science and Engineering and all amendments to any such constitution must be submitted for approval to the Council of the Faculty. All programmes of such societies or associations must, before publication, receive the sanction of the Council of the Faculty through the Dean. Permission to invite any person not a member of the Staff of the University to preside at or address a meeting of any society or association must be similarly obtained.

The name of the University is not to be used in connection with a publication of any kind without the permission of the Caput.

### HART HOUSE

Hart House, the gift of the Massey Foundation, is the Undergraduates' Union of the University of Toronto.

Hart House contains completely equipped club rooms, including common rooms, reading room, music room, lecture room, sketch room, photographic dark rooms, the Great Hall, used as a dining hall, a small chapel, the offices and class rooms of the Students Christian Association, gymnasium and swimming pool, rifle range, billiard room and the Hart House theatre.

All male students proceeding to a degree in the University are members of Hart House. An annual fee imposed by the University, covers the fee of the Students' Administrative Council, all club fees in connection with Hart House, and membership in the Athletic Association, including the medical examination.

Other male students in the University, or students in the affiliated or federated institutions receiving instruction in the University, may become members of Hart House on payment of the required fee.

Graduates are entitled to the full privileges of Hart House on payment of an annual fee of \$10.00. Out-of-town graduates may become members on payment of an annual fee of \$2.50.

A group of rooms is set apart for the use of the Faculty Union. There is also a common room for the use of graduates. Five guest rooms are available for the use of guests, for periods of a week or less, at a reasonable rental.

The Theatre is under the management of the Players' Club of the University of Toronto, and is available for productions by any of the Dramatic Clubs within the University.

For further information, apply to the Warden of Hart House.

### STUDENTS' ADMINISTRATIVE COUNCIL

The Students' Administrative Council has been entrusted by the Caput with supervision of the conduct of the students, and has power subject to the approval of the Caput to deal with violations of the regulations governing conduct.

Any student who may be convicted of having taken part in a parade or procession through the city which has not been authorized by the police authorities after application by the Executive of the Students' Administrative Council, will be severely disciplined.

### WOMEN STUDENTS' ADMINISTRATIVE COUNCIL

The Women Students' Administrative Council is the representative organ of the women students of the University of Toronto, and aims to co-ordinate all intercollegiate activities. It consists of representatives from all colleges and faculties. A fee of \$3 is paid for the council by each woman student proceeding to the Bachelor's degree. The council assumes joint financial responsibility with the men's council for the publication of *Varsity, Torontonensis*, and the *Directory*.

### UNIVERSITY OF TORONTO ATHLETIC ASSOCIATION

This organization has full control of the Athletic activities of the University undergraduates.

The Athletic Directorate is the executive of this association and is composed of two representatives from the teaching staff, five from the undergraduates and two from the graduates.

The regulations of the A.A.U. of C. require that every student who wishes to participate in athletic contests with outside clubs during the academic session must obtain a permit from the University Athletic Association.

## 1. DEPARTMENT OF CIVIL ENGINEERING

The courses of study in Civil Engineering are designed to give the student a sound training in the fundamental scientific principles on which the practice of the profession is based. The instruction is given by means of lectures and practical work in the field, the drafting room and the laboratory. In this way the student is led to apply the principles developed in the class room.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Optics.....	185	1	2	1	2
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing.....	166	0	11	0	18
Physical Training.....	...	0	2	0	2

### SECOND YEAR

Subject	No.	Hours per week			
		First Team		Second Term	
		Lent.	Lab'y	Lect.	Lab'y
Vacation Work.....	286	...	..	..	..
Calculus.....	237	1	0	1	0
Spherical Trigonometry.....	239	1	0	0	0
Elementary Astronomy.....	71	1	0	1	0
Descriptive Geometry.....	162	1	0	1	0
Surveying.....	272, 273	1	9	1	0
Dynamics.....	3	1	0	1	0

## SECOND YEAR—Cont.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	1	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Geology.....	195	0	0	2	0
Mineralogy.....	257,259	2	1	0	2
Hydrostatics.....	186	0	0	1	1
Heat.....	187	1	1½	0	0
Photography.....	188	1	1½	0	1½
Economics & Finance.....	123	1	0	1	0
Chemical Laboratory.....	89	0	3	0	3
Engineering Drawing.....	169	0	4½	0	13½
Physical Training.....	...	0	2	...	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Survey Camp.....	275	...	...	...	...
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	6	2	0	2	0
Thermodynamics.....	223	1	0	1	2
Hydraulics.....	205, 206	2	0	2	3
Least Squares.....	240	0	0	1	0
Practical Astronomy and Geodesy.....	72, 73	2	2	2	0
Descriptive Geometry.....	164	1	0	0	0
Surveying and Levelling.....	274	1	0	1	0
Electricity.....	143	1	3	1	0
Stress Graphics.....	10	1	0	1	0
Cements and Concrete.....	11	0	0	1	0
Engineering Geology.....	197	1	0	1	0
Commercial Law.....	124	1	0	1	0
Public Speaking.....	133	1	0	0	0
Mechanics of Materials Laboratory.....	9	0	3	0	0
Engineering Drawing.....	173	0	12	0	15

28 UNIVERSITY OF TORONTO CALENDAR 1922-1923

FOURTH YEAR

(a) Astronomy Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Astronomy.....	74, 76	2	23	2	0
Geodesy.....	75, 76	2	0	2	23
Photographic Surveying.	191	1	2	0	0

FOURTH YEAR

(b) Municipal Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Hydraulics.....	211	1	3	0	0
Structural Design.....	17	1	0	0	5
Miscellaneous Structures	19	0	0	1	0
Hygiene and Bacteri- ology.....	82	1	0	1	6
Biology.....	81	0	5	0	0
Sanitary Chemistry.....	117	1	6	0	4
Sanitary Engineering....	280	1	3	1	6
Highway Engineering...	281	1	3	1	3
Municipal Seminar (in- cluding Town Plan- ning).....	282	0	3	0	3
Municipal Administra- tion (including Civics)	132	1	0	1	0

## FOURTH YEAR—(c) Structural Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete.....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
Physical Metallurgy.....	252	1	0	1	0
Structural Design.....	17	1	0	1	0
Mill Building Design....	18	1	0	0	0
Miscellaneous Structures	19	0	0	1	0
Mechanics of Materials Laboratory.....	13	0	3	0	6
Structural Design Draw- ing.....	178	0	22	0	22

## FOURTH YEAR—(d) Hydraulic Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete.....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
Hydraulics.....	207, 208, 209	3	10	3	10
Physical Metallurgy.....	252	1	0	1	0
Structural Design.....	17	1	0	1	0
Mill Building Design....	18	1	0	0	0
Miscellaneous Structures	19	0	0	1	0
Electrical Laboratory...	144	0	0	0	3
Mechanics of Materials Laboratory.....	13	0	6	0	3
Structural Design Draw- ing.....	179	0	4	0	8

## FOURTH YEAR

## (e). Railway Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	17	2	0	2	0
Hydraulics.....	211	1	3	0	0
Special Geology.....	204	0	0	1	1½
Physical Metallurgy....	252	1	0	1	0
Electrical Laboratory..	144	0	0	0	3
Motive Power.....	225	1	0	1	0
Railway and Miscellane- ous Structures.....	20, 19	1	0	1	0
Railway Economics.....	131	2	0	2	0
Railway Location and Design.....	276	1	8	1	6
Mechanics of Materials Laboratory.....	13	0	3	0	6
Structural Design Draw- ing.....	179	0	6	0	6

## 2. DEPARTMENT OF MINING ENGINEERING

This course, originating in 1878 as Assaying and Mining Geology, is designed to give the student a sound training in the fundamental scientific knowledge on which the practice of the various branches of Mining Engineering is based. The field of the Mining Engineer is so wide and his activities so varied that this course has become a very broad one. It is the most inclusive of all the Engineering Courses. In general it is designed in the earlier years to give the student, in addition to the fundamental principles, a good training in the subjects of Engineering essential to all branches, such as drawing, surveying, etc., and then in later years to devote more time to those studies peculiar to Mining Engineering.

Candidates for the degree of B.A.Sc. in this department will be required to present satisfactory evidence of having had at least eight months' practical experience in work connected with Mining, Metallurgy or Geology. Candidates for the degree of M.A.Sc. in this department (see page 87) have splendid opportunities for research work in the Assaying and Ore-dressing laboratories. Investigation and research are becoming more and more an integral part of all Mining operations and this fifth year is a special training in this direction. In addition to some special research work, all candidates for this advanced degree are required to devote some time to the study of the following subjects: Cost Keeping in connection with efficiency and motion study, Patents and Technical Writing.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Mineralogy.....	255, 258	2	1	0	3
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Mining Laboratory.....	50	0	0	0	3
Engineering Drawing.....	166	0	11	0	14
Physical Training.....		0	2	0	2

## 32 UNIVERSITY OF TORONTO CALENDAR 1922-1923

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Notes.....	286				
Descriptive Geometry.....	162	1	0	1	0
Surveying.....	272, 273	1	6	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Inorganic Chemistry.....	87	1	0	1	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Geology.....	195	0	0	2	0
Mineralogy.....	260, 261	1	2	1	2
Mining.....	51	1	3	0	0
Theory of Measurements..	63	1	0	0	0
Ore Dressing.....	57	1	0	0	0
Steam Engines.....	216	0	0	1	0
Theory of Mechanism.....	230	2	0	2	0
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	89, 90	0	6	0	6
Engineering Drawing.....	169	0	3	0	12
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Letters.....	66				
Survey Camp.....	275				
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	7	2	0	0	0
Hydraulics.....	205	2	0	2	0
Analytical Chemistry.....	88	1	0	1	0
Electricity.....	143	1	0	1	0
Assaying.....	45, 46	1	3	0	3
Economic Geology.....	198, 203	1	0	2	2
Ore Deposits.....	202	1	0	1	0
Ore Dressing.....	58, 59	1	3	1	3
Physics of Ore Dressing....	62	1	0	1	0
Mining.....	54	0	0	2	0
Petrography.....	262	1	0	1	0
Metallurgy.....	243	1	0	1	0

## THIRD YEAR—Cont.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Physical Metallurgy.....	244	0	0	2	0
Commercial Law.....	124	1	0	1	0
Mineralogy Laboratory ...	263	0	2	0	2
Introductory Research.....	64	0	0	0	3
Chemical Laboratory .....	99	0	3	0	6
Mechanics of Materials Laboratory.....	9	0	0	0	3
Engineering Drawing.....	174	0	9	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Letters.....	66				
Thesis.....	65	0	7	0	10
Mine Cost Keeping and Management.....	56	1	0	1	0
Thermodynamics.....	223	1	0	1	0
Assaying.....	47, 48	0	0	1	3
Electrochemistry.....	107, 108	2	3	0	0
Geology-Glacial and Archean.....	199	2	1	2	0
Geology-Mining.....	200	1	0	1	0
Metallurgy.....	247	1	0	1	6
Mining.....	55	1	0	1	0
Ore Dressing.....	60, 61	1	6	1	0
Business.....		1	0	1	0
Metallography.....	251	0	0	0	3
Power Electrical Lab'y... Hydraulics Lab'y..	144 210	0 0	3 3	0 0	0 0
Thermodynamics Lab'y.....	224	0	0	0	3

### 3. DEPARTMENT OF MECHANICAL ENGINEERING

The course in this Department is designed to meet the needs of those students who are intending to take up the work connected with Mechanical Engineering, such as the design of gas engines, steam engines, steam boilers, steam turbines, air compressors, etc.; the design and installation of the machinery connected with power plants and central stations, steam piping and other similar problems. The work is also so arranged that the student becomes somewhat familiar with the design of travelling cranes and mill buildings and similar problems connected with structural steel work.

Since the work of the mechanical engineer and of the electrical engineer is closely allied, the courses in these two departments in the first two years are practically identical and cover the subjects mentioned below.

In the third year the work becomes more specialized, the mechanical engineers paying more attention to heat engines of various types, and to mill building design and other work of similar nature. The study of electricity is continued and the student gets considerable practice in the mechanical and electrical laboratories.

In the fourth year the student devotes himself still more closely to his chosen work, placing the greater stress on thermodynamics and the theory and testing of heat engines, and problems in machine design and also in the design of hydraulic power plants with their accessories and pumps. Much time is spent in the mechanical laboratories testing gas and steam engines, water turbines and other hydraulic machinery.

Before receiving the degree in this department candidates are required to present satisfactory evidence of having had at least eight months' practical experience in one of the principal trades connected with Mechanical Engineering, the object being that graduates may have some practical knowledge of the duties of the workman in this branch of engineering, as distinguished from those of the purely technical man. Certificate forms will be furnished on application. These forms contain full details in regard to the work required and should be obtained by the candidate before he enters his employment.

## FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry....	238	1	0	2	0
Descriptive Geometry....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry..	85	2	0	1	0
Electricity.....	135	2	0	2	0
Illuminating Engineering	185	1	2	1	2
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing....	166	0	11	0	18
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Descriptive Geometry...	162	1	0	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials..	4	2	0	2	0
Engineering Chemistry..	93	1	0	1	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Hydrostatics.....	186	0	0	1	1½
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Steam Engines.....	216	1	0	1	0
Theory of Mechanism...	230	2	1½	2	1½
Economics and Finance..	123	1	0	1	0
Chemical Laboratory....	89	0	3	0	3
Engineering Drawing....	170	0	13	0	11
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Theory of Structures.....	7	2	0	0	0
Thermodynamics.....	217, 219	2	3	2	3
Hydraulics.....	205, 206	2	0	2	3
Heat Engines.....	218	2	0	2	0
Mechanics of Machinery.	231	1	0	1	0
Machine Design.....	233	2	4	2	10
Magnetism Electricity..	138, 140	2	3	0	0
Alternating Current ....	139	1	0	1	3
Physical Metallurgy.....	244	0	0	2	0
Stress Graphics.....	10	1	0	0	0
Commercial Law.....	124	1	0	1	0
Mechanics of Materials Laboratory.....	9	0	0	0	3
Engineering Drawing....	177	0	9	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Engineering Economics..	125	0	0	1	0
Shop Managements and Costs.....	130	1	0	1	0
Structural Design.....	17	1	3	0	3
Mill Building Design....	18	1	0	0	0
Machine Design.....	234	1	5	1	5
Electrical Laboratory...	144	0	0	0	3
AND TWO OF:					
Thermodynamics....	220, 221, 222	3	9½	3	9
Hydraulics.....	207, 208, 209	3	9½	3	9
Mechanics of Materials including Structural Design Drawing....	12, 13, 15, 17, 181}	4	6	4	3
		0	4	0	6

#### 4. DEPARTMENT OF ARCHITECTURE

The instruction in this department is arranged to lay a broad foundation for the subsequent professional life of its graduates, and incidentally to prepare its students to be immediately useful in an architect's office. The curriculum has been arranged to meet the aesthetic and scientific needs of the profession, and includes History and Principles of Architecture, Freehand Drawing in pencil, ink and colour, Modelling, Architectural Design, Analysis and criticism of Buildings, Mathematics, Statics, Strength and Elasticity of Materials, Theory of Construction and Heating and Ventilation.

The equipment of the department includes a working library, current periodicals, photographs, lantern slides, and a large collection of Architectural models and casts.

##### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry....	238	1	0	2	0
Descriptive Geometry....	161	1	0	1	0
Statics.....	1	2	0	2	0
Building Measurements..	37	1	7	1	0
Elements of Architecture	28	1	0	1	0
History of Architecture..	25	1	3	1	0
Technical English.....	122	1	0	1	0
French.....	266	2	0	2	0
Modelling.....	36	0	2	0	2
Freehand Drawing.....	35	0	3	0	2
Architectural Drawing...	167	0	9	0	18
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	285				
Descriptive Geometry...	163	1	0	1	0
Mechanics of Materials..	5	2	0	2	0
Architectural Design....	31	1	0	1	0
History of Architecture..	26	1	0	1	0
History of Ornament....	29	1	0	1	0
Illumination.....	189	1	1½	1	1½
Economics and Finance..	123	1	0	1	0
English.....		2	0	2	0
French.....	266	1	0	1	0
Modelling.....	36a	0	2	0	2
Freehand Drawing.....	35a	0	3	0	3
Architectural Design }	171	0	17	0	17
Architectural Drawing }		0	2	0	2
Physical Training.....					

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Structural Design.....	16	2	0	2	0
Accoustics.....	190	1	1½	1	0
Building Materials.....	38	2	0	2	0
History of Architecture..	27	1	0	1	0
History of Fine Art.....	30	1	0	1	0
Architectural Design....	32	1	0	1	0
Commercial Law.....	124	1	0	1	0
French.....	266	1	0	1	0
Mechanics of Materials..	9	0	0	0	2
Modelling.....	36b	0	2	0	2
Water Colour Painting..	35b	0	3	0	3
Architectural Design }	175	0	18	0	18
Architectural Drawing }					

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	286	0	3	0	3
Contracts and Specifica- tions.....	127	0	0	1	0
Reinforced Concrete.....	15	1	0	0	2
Structural Design.....	16	1	0	1	0
Heating and Ventilating.....	40	1	0	1	0
Sanitary Science.....	39	1	0	1	0
Drawing from Life.....	35c	0	3	0	3
Modelling from Life.....	36c	0	2	0	2
AND ONE OF:					
Architectural Design..	33	2	24	2	22
Architectural Engineer- ing .....	34, 18	4	22	3	20

## 6. DEPARTMENT OF CHEMICAL ENGINEERING

In many industries there is a demand for a man who combines the technical knowledge of the mechanical engineer with a knowledge of chemistry. It is to fill this want that the course in Chemical Engineering is designed.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	0	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Optics.....	185	1	2	1	2
Technical English.....	122	1	0	1	0
German.....	267	1	0	1	0
Business.....	121	0	0	1	0
Mineralogy Laboratory.....	256	0	0	0	3
Biological Laboratory.....	80	0	3	0	3
Chemical Laboratory.....	86	0	10	0	10
Engineering Drawing.....	168	0	4	0	4
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	1	0
Organic Chemistry.....	96	2	0	2	0
Metallurgy.....	241	0	0	1	0
Hydrostatics.....	186	0	0	1	1
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Industrial Chemistry.....	94	1	0	1	0
Physical Chemistry.....	98	2	0	2	0
Inorganic Chemistry.....	87	1	0	0	0
German.....	267	1	0	1	0
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	92	0	10	0	12
Engineering Drawing.....	172	0	7	0	3
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	7	2	0	0	0
Thermodynamics.....	217	2	2	2	0
Hydraulics.....	205	2	0	2	1
Metallurgy.....	243	1	0	1	0
Ferro-Metallurgy.....	244	0	0	2	0
Assaying.....	49	0	0	0	3
Analytical Chemistry.....	88	1	0	1	0
Electrochemistry.....	107, 108	2	3	0	0
Industrial Chemistry.....	103	1	0	1	0
Organic Chemistry.....	106	2	0	2	0
Chemical Plant.....	104	1	0	1	0
German.....	267	1	0	1	0
Commercial Law.....	124	1	0	1	0
Power.....	144, 224, 206	0	3	0	3
Chemical Laboratory.....	100	0	5	0	14
Engineering Drawing.....	177	0	6	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Shop Management and Costs.....	130	1	0	1	0
Machine Design.....	233	2	4½	0	0
German.....	267	1	0	1	0
Inorganic Chemistry.....	109	1	0	2	0
Organic Chemistry.....	110	1	0	1	0
AND ONE OF:					
Electrochemistry.....	114, 115	2	*	2	*
Industrial Chemistry....	112, 113	1	*	1	*
Sanitary and Forensic Chemistry and Bacteriology.....	116	1	*	2	*
Metallurgy.....	247	1	*	1	*

\*All time not otherwise allotted must be spent in the various laboratories concerned in the proportions assigned by the Department.

## 7. DEPARTMENT OF ELECTRICAL ENGINEERING

The course in Electrical Engineering is arranged to provide preliminary training for those who would follow any of the various lines of activity connected with electrical industry.

The first two years of the course are devoted to fundamental scientific principles, and incidentally more or less of their application to engineering problems in mechanical, civil and electrical work. Many problems are solved in the drafting rooms by graphical methods. The third year includes further theoretical work, more particular attention being given to electrical and mechanical studies in theory, operation and design. The fourth year is devoted to advanced work in alternating current theory and practice combined with similar study in thermodynamics, hydraulics or electrochemistry.

A large amount of laboratory practice is provided, most of which belongs to the third and fourth years. In this last year most of the time is spent in laboratory investigations and studies resulting therefrom.

Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in one of the principal trades connected with Electrical Engineering, the object being that graduates may have some practical knowledge of the technique of this branch of engineering. Certificate forms will be furnished on application. These forms contain full details in regard to the work required.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Illuminating Engineering.....	185	1	2	1	2
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing.....	166	0	11	0	18
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Descriptive Geometry.....	162	1	0	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	1	0
Organic Chemistry.....	95	0	0	1	0
Hydrostatics.....	186	0	0	1	1½
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Steam Engines.....	216	1	0	1	0
Theory of Mechanism.....	230	2	1½	2	1½
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	89	0	3	0	3
Engineering Drawing.....	166	0	12	0	12
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry.....	102	1	0	1	0
Thermodynamics.....	217, 219	2	2	2	1½
Hydraulics.....	205	2	0	2	1
Heat Engines.....	218	1	0	1	0
Mechanics of Machinery.....	231	1	0	1	0
Machine Design.....	233	2	4½	2	4½
Alternating Current.....	139	1	0	1	0
Physical Metallurgy.....	244	0	0	2	0
Electrochemistry.....	107, 108	2	3	0	0
Magnetism and Electricity.....	138	2	0	2	0
Electrical Design.....	141, 142	1	3	1	3
Commercial Law.....	124	1	0	1	0
Electrical Laboratory.....	140	0	6	0	6

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Engineering Economics..	125	0	0	1	0
Shop Management and Costs.....	130	1	0	1	0
Applied Electricity.....	145, 146	4	20	4	19
AND ONE OF:					
Hydraulics.....	207, 208, 209	3	10	3	10
Thermodynamics.....	220, 221, 222	3	9	3	9
Electrochemistry.....	114, 115	2	9	2	9

## 8. DEPARTMENT OF METALLURGICAL ENGINEERING

The object of this course is to provide instruction and preliminary training for those who intend to become metallurgical engineers. Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in metallurgical work.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry..	85	2	0	1	0
Electricity.....	135	2	0	2	0
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Mineralogy Laboratory..	256	0	0	0	3
Engineering Drawing....	166	0	11	0	14
Physical Training.....		0	2	0	2

### SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Dynamics.....	3	1	0	1	0
Mechanics of Materials..	4	2	0	2	0
Chemistry.....	87, 88, 91	2	14	1	13
Metallurgy.....	241, 242	1	0	2	0
Geology and Ore Deposits.....	196	1	1	1	1
Steam Engines.....	216	0	0	1	0
Electricity.....	136, 137	2	3	2	3
Spanish.....	268	1	0	1	0
Economics and Finance..	123	1	0	1	0
Engineering Drawing....	172	0	3	0	6
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Cements and Concrete...	11	0	0	1	0
Heat Engines.....	218	1	0	1	0
Electricity.....	143, 144	1	3	1	3
Electrochemistry.....	107, 108	2	3	0	0
Assaying.....	45, 46	1	4	0	0
Ore Dressing.....	58, 59	1	3	1	3
Mining.....	51, 52	1	0	1	0
Metallurgy.....	245, 246	3	6	2	6
Machine Design....	233	2	0	2	3
Commercial Law.....	124	1	0	1	0
Chemical Laboratory...	101	0	0	0	6
Engineering Drawing....	177	0	3	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	6	0	6
Engineering Economics..	125	0	0	1	0
Contracts and Specifica- tions.....	127	0	0	1	0
Plant Management.....	129	1	0	0	0
Thermodynamics.....	223	1	0	1	0
Assaying.....	47, 48	0	0	1	3
Ore Dressing.....	60, 61	1	6	1	0
Electrochemistry.....	114, 115	2	3	2	3
Metallurgy.....	249, 250	2	8	2	8
Metallurgy Problems...	248	2	0	2	
Power	Thermodynamic Laboratory....	224	0	3	0
	Hydraulic Lab- oratory.....	210	0	0	3

## OUTLINE OF LECTURE AND LABORATORY COURSES

---

On the following pages the courses of instruction are set forth in detail. The time devoted to the various subjects, both for lectures and practical work, is indicated as accurately as possible.

The courses are designed to give the student a sound training in the fundamental scientific principles on which the various branches of engineering are based. The instruction is given by means of lectures and practical work in the laboratories, the drafting rooms and the field.

The courses in the first two years are devoted to the theoretical and essential scientific requirements of the engineering profession as a whole, with an introduction in a few cases of the practical application of these to engineering problems.

In the third and fourth years, the subjects of the former years are continued with particular attention paid to their application to modern engineering practice in the problems of design, erection, installation and operation peculiar to the several branches of the profession.

### APPLIED MECHANICS

#### 1. *Statics*:—T. R. Loudon.

All Departments, I. Year; 2 hours per week, both terms.

This course of lectures deals with forces in a single plane, and concerns chiefly the calculation of tension, compression and shearing stresses in frame structures and solid beams. It also deals with the consideration of problems relating to friction.

#### 2. *Dynamics*:—J. McGowan.

Departments 1, 2, 3, 6, 7, 8, I Year; 2 hours per week; both terms.

This course of lectures deals with bodies having motion of translation in one plane; also with relative motion, momentum, work and energy.

Text Book:—Tutorial Dynamics—Briggs and Bryan.

#### 3. *Dynamics of Rotation*:—W. J. Loudon.

Departments 1, 2, 3, 7, 8, II Year; 1 hour per week; both terms.

This course covers angular motion, including moments of inertia, simple harmonic motion, the pendulum, centres of mass, suspension and percussion, the simple theory of the fly-wheel and the governor.

Text Book:—Dynamics of Rotation—Worthington.

4. *Mechanics of Materials:*—P. Gillespie.

Departments 1, 2, 3, 6, 7, 8, II Year; 2 hours per week; both terms. In this course the strength and elasticity of materials are mathematically treated. The stresses in such elements of structures as the tie rod, the beam, the strut and the member subjected to shear are investigated and the elementary principles of design established. In the lecture and drafting rooms through numerous problems involving the design of simple beams, columns, riveted connections, etc., these principles are exemplified. The work includes also the discussion of eccentric loading, suddenly applied loads and repeated stresses.

Reference Book:—Mechanics of Materials—Merriman.

5. *Mechanics of Materials:*—T. R. Loudon.

Department 4, II Year; 2 hours per week; both terms.

This course deals with the mathematical consideration of stress and elasticity. Among the problems taken up are the consideration of riveted joints, theory of simple and continuous beams, the theory of columns and simple column footings.

6. *Theory of Structures:*—C. R. Young.

Department 1, III Year; 2 hours per week; both terms.

The work of the first term comprises a thorough discussion of combined stresses, restrained, continuous and trussed beams, multiple beams and box girders, plate girders and certain practical aspects of column design. A number of designs of girders and structural details are worked out in the class and drafting rooms.

The second term is given chiefly to the design of a riveted truss highway span and a riveted truss railway span, the complete designs being made in the lecture and drafting rooms.

Text Books:—Modern Framed Structures, Part III—Johnson, Bryan and Turneaure; Structural Problems—Young; Carnegie Pocket Companion; Cambria Steel.

7. *Theory of Structures:*—C. R. Young.

Departments 2, 3, 6, III Year; 2 hours per week; first term.

The work is practically the same as that for Department I in the first term.

8. *Structural Design:*—T. R. Loudon.

Department 4, III Year; 2 hours per week; both terms.

During the first term, the economics of the design of floor systems in timber and structural steel are discussed. The design of masonry piers, structural steel and timber columns is also gone into in the first term.

The second term is taken up in the discussion of the design of roof trusses and plate girders.

**9. Mechanics of Materials:**—J. McGowan.

Department 1, 2, 3, 4, III Year; 3 hours per week; one term.

This laboratory course is intended to give the student an introduction to the experimental study of the strength and elasticity of materials. It is intended that he shall acquire some familiarity with the construction and operation of testing machines and with the properties of the ordinary building materials.

Reference Book:—*Laboratory Instructions, Department of Applied Mechanics*, U. of T., 1922.

**10. Stress Graphics:**—T. R. Loudon.

Department 1, III Year; one hour per week; both terms.

Department 3, III Year; one hour per week; first term.

This course of lectures deals mainly with graphic methods of solving stresses in framed structures. The construction of Shearing Force diagrams, Bending Moment diagrams and Influence Lines is also dealt with.

**11. Cements and Concrete:**—P. Gillespie.

Departments, 1, 8, III Year; one hour per week; second term.

The manufacture, testing and use of Portland cement and the fundamentals of the theory of reinforced concrete are discussed in this course of lectures.

**12. Theory of Structures:**—J. McGowan.

Departments 1, 3, IV Year; 2 hours per week; both terms.

The work taken up in this course of lectures consists in swing bridges, arches, suspension bridges and some special features in column construction.

Reference Books:—*Modern Framed Structures*—Johnson; *Typical Steel Railway Bridges*—Thomson.

**13. Mechanics of Materials:**—P. Gillespie.

Departments 1, 3, IV Year; a laboratory course of 3 hours per week one term and 6 hours per week the other term.

This course of experiments is intended to give the student practice in investigating the elastic and physical properties of iron, steel, concrete, timber and other building materials.

Reference Book:—*Materials of Construction*—Johnson.

**14. Foundations, Retaining Walls and Dams:**—P. Gillespie, W. J. Smither.

Department 1, IV Year; 1 hour per week; both terms.

This course of lectures is devoted to the design of the structures mentioned. Preparatory to the discussion of the practical aspects of the subjects, and in order to gain familiarity with the fundamental principles involved, a part of the first term is given over to the consideration of the theory of compound stress. The most approved forms of construction of retaining walls, footings, abut-

ments, piers and dams are then described, and typical designs are worked out in the class and drafting rooms.

**Text Books and Books of Reference:**—Retaining Walls for Earth—M. A. Howe; Walls, Bins and Grain Elevators—M. S. Ketchum; A Treatise on Masonry Construction—I. O. Baker; Design and Construction of Dams—E. Wegmann.

**15. Reinforced Concrete:**—P. Gillespie.

Departments 1, 4, IV Year; 1 hour per week; both terms.

The theory of the strength of reinforced concrete elements including the beam, the slab, the T-beam and the column, is continued in this course.

The analysis of the monolithic arch by the elastic theory is discussed, and the student is required in the drafting room to apply his knowledge to the design of simple structures.

**Reference books:**—Principles of Reinforced Concrete Construction—Turneaure and Maurer; Reinforced Concrete Construction, Vol. I—Hool.

**16. Structural Design:**—T. R. Loudon.

Department 4, IV Year; 1 hour per week; both terms.

During this course of lectures, the economics of the design of complete buildings in timber, reinforced concrete and steel are discussed. This course of lectures is supplemented by the actual designing of buildings in the drafting room.

**17. Structural Design:**—C. R. Young, W. J. Smither.

Department 1<sub>c</sub>, 1<sub>d</sub>, IV Year; 1 hour per week; both terms.

Department 1<sub>b</sub> and 3, IV Year; 1 hour per week; first term.

This course of lectures is devoted to the problems connected with the structural design of buildings of timber, steel and reinforced concrete. The various structural elements such as the floors, columns, footings, walls and wind bracing, are fully discussed, and portions of typical buildings are designed in the class and drafting rooms.

**Text Books:**—Handbook of Building Construction—Hool and Johnson; Architects' and Builders' Handbook—Kidder—Nolan.

**18. Mill Building Design:**—C. R. Young, W. J. Smither.

Departments 1<sub>c</sub>, 1<sub>d</sub>, 3 and 4, IV Year; 1 hour per week; first term.

Consideration is given in this course to the various types of mill buildings, to the conditions governing the choice and to the details of construction in different materials. Designs of portions of mill buildings are worked out in the class and drafting rooms.

**Text Books:**—Mill Buildings—Tyrrell; Steel Mill Buildings—Ketchum.

19. *Miscellaneous Structures*:—W. J. Smither.

Department 1, IV Year; 1 hour per week; second term.

In this course of lectures the application of theoretical principles to the design of a variety of structures is made. Among those structures discussed are transmission line towers, elevated tanks and their supporting towers, standpipes, large pressure pipes, sewers, culverts, small highway bridges, sub-surface tanks and tall chimneys. Whenever possible the lecture work is followed up by designs in the drafting room.

20. *Railway Structures*:—C. R. Young.

Department 1<sub>e</sub>, IV Year; 1 hour per week; first term.

A course of lectures with exercises covering alternative bridge layouts with comparative estimates of costs; temporary and permanent trestles; tunnels; tunnels vs. bridges; buildings; snow sheds and shelters.

## ARCHITECTURE

25. *History of Architecture*:—H. H. Madill.

Department 4, I Year; 1 hour per week; both terms.

In this course the development of architecture is treated very briefly and in an elementary manner, from the Pyramids of Egypt to the present day.

26. *History of Architecture*:—Adrian Berrington.

Department 4, II Year; 1 hour per week; both terms.

The Antique, Renaissance and the Modern styles are dealt with more fully than is possible in the elementary history.

27. *History of Architecture*:—A. W. McConnell.

Department 4, III Year; 1 hour per week; both terms.

In this course the work of the previous year is continued, with special attention given to the development of buildings in planning and detail.

28. *Elements of Architecture*:—H. H. Madill.

Department 4, I Year; 1 hour per week; both terms.

Lectures on the Five Orders of Architecture, their affiliated forms and the other elements used in design. Simple problems in elementary design involving the use of the orders and other elements are set from time to time.

29. *History of Ornament*:—H. H. Madill.

Department 4, II Year; 1 hour per week; both terms.

In this course the development of Ornament is traced from the beginning through Egyptian, Assyrian, Grecian, Roman, Byzantine,

Romanesque, Gothic and Renaissance styles. An attempt is made to analyze ornament of the best periods and to systematize the principles followed in form and colour. The development and types of mouldings are also studied.

30. *History of Fine Art*:—C. W. Jefferys, Frederick Coates.

Department 4, III Year; 1 hour per week; both terms.

In the first term the course consists of an outline of the history and development of painting and of the minor pictorial arts from the earliest time until the present day.

In the second term an outline of the history and development of the different eras of sculpture ranging from the primitive to the present day, is given.

31. *Architectural Design*:—A. W. McConnell and Adrian Berrington.

Department 4, II Year; 1 hour per week; both terms.

This course is given by means of individual instruction in the classroom by criticisms of the solutions of different problems set during the year and by a series of lectures. It is in this course that the student begins the serious study of design; continued practice in architectural drawing and rendering affords the training necessary to make the student a proficient draughtsman.

32. *Architectural Design*:—A. W. McConnell and Adrian Berrington.

Department 4, III Year.

Theory and practice of Design.

This course is given by individual instruction in the studio and by lectures. The greater part of the course is devoted to problems in design, and forms a continuation of the course given in the preceding year.

33. *Architectural Design*:—A. W. McConnell and Adrian Berrington.

Department 4, IV Year.

The entire course is devoted to advanced academic training in designing the more monumental classes of buildings.

34. *Architectural Design*:—A. W. McConnell and Adrian Berrington.

Department 4, IV Year; Architectural Engineering Option.

A short course of lectures and studio work referring especially to the artistic side of the design of commercial buildings.

35. *Freehand Drawing and Water Colour Painting*:—C. W. Jefferys.

Department 4, I Year; 3 hours per week; both terms.

Drawing from still life objects. Primary free hand perspective. Primary pencil, charcoal, and pen and ink rendering.

- 35a. Department 4, II Year; 3 hours per week; both terms.

Drawing and monochrome painting from still life.

Drawing from the cast.

Pencil, pen and ink, and monochrome rendering.

Primary water colour.

Drawing from landscape and natural objects.

- 35b. Department 4, III Year; 3 hours per week; both terms.

Drawing from the cast.

Water colour from still life. Water colour rendering.

• Drawing from landscape and natural objects.

Students who are sufficiently advanced are admitted to the Fourth Year Life Drawing Class.

- 35c. Department 4, IV Year; 3 hours per week; both terms.

Water colour from still life and from landscape.

Drawing from life.

Water colour rendering.

36. *Modelling*:—Frederick Coates.

Department 4, I Year; 2 hours per week; both terms.

The Orders. Synopsis of styles.

- 36a. Department 4, II Year; 2 hours per week; both terms.

Problems in figures and in relation to architecture.

- 36b. Department 4, III Year; 2 hours per week; both terms.

Styles continued.

Problems, combination of figure, ornament and architecture and their relative values.

- 36c. Department 4, IV Year; 2 hours per week; both terms.

Modelling from life.

Anatomy.

Composition of groups.

37. *Building Measurement*:—C. H. C. Wright.

Department 4, I Year; 1 hour per week; both terms.

In this course of lectures the principles of measurements and mensuration with special reference to buildings will be discussed. With this is combined practice in measurements of existing buildings, quantities, etc.

38. *Building Materials*:—C. H. C. Wright.

Department 4, III Year; 2 hours per week; both terms.

The structural and aesthetic value of the various building materials.

39. *Sanitary Science*:—H. H. Madill.

Department 4, IV Year; 1 hour per week; both terms.

Modern plumbing, its design and installation, drainage, sewerage disposal and water supply.

40. *Heating and Ventilating*:—C. H. C. Wright.

Department 4, IV Year; 1 hour per week; both terms.

The design of different systems, where they should be used, heating specifications, etc.

### ASSAYING, MINING AND ORE DRESSING

The work in Mining is directed more to the development of the proper attitude of mind towards mining problems than to the teaching of actual mining methods.

The teaching of Assaying has a two-fold function. The first is to give the student a working knowledge of the practice of the art, so that he can earn money as an assayer on graduation and use this as a stepping-stone to other positions. The second is to use the assaying laboratories for the training of the students in certain important phases of Engineering methods. The size of the apparatus, the completeness of the processes in short intervals of time, the extreme accuracy of results when so desired, the relation of the extent of error to time and method, the similarity of the academic laboratory to the field laboratory, all these permit an unrivalled opportunity for driving home much broad Engineering philosophy. The assaying processes and apparatus lend themselves peculiarly well for the development of a proper perspective in regard to errors and accuracy in measurements.

The study of Ore Dressing, when accompanied by laboratory work in a well equipped ore dressing laboratory, is one of the most important of the Mining Engineering subjects. Not only is the mechanical treatment of ores a very important branch of Mining Engineering, but the mental processes involved in a study of the fundamental principles underlying the art and the compromise necessary for field practice form one of the best fields for the development of Engineering philosophy. From these points of view the ore dressing laboratory is exceptionally well equipped.

#### 45. *Assaying*:—J. T. King.

Departments 2-8, III Year; 1 hour per week; first term.

A first course of lectures on the theory of fire assaying. Emphasis is laid not only on the chemical and metallurgical principles involved, but upon the errors inherent in operators as well as in methods.

Text Book—"Fulton" Manual of Fire Assaying.

#### 46. *Assaying*:—J. T. King.

Departments 2-8, III Year; 3 hours per week; both terms.

A laboratory course in the determination of the precious metals in ores, milling and metallurgical products. Scorification and crucible assays of ores and products, pure and impure, fluxes, slags and solutions. Buckboard practice, ores with metallics. Copper and lead by electrolysis. Students are expected to do their later assays with despatch and a reasonable degree of accuracy. Neatness of work is required.

## 56 UNIVERSITY OF TORONTO CALENDAR 1922-1923

### 47. Assaying:—J. T. King.

Departments 2-8, IV Year; 1 hour lecture per week; second term.  
A continuation of course 45. Complex ores. Combination assays.  
The sampling and assay of bullion. The Platinum group metals.  
Checks and corrections.

### 48. Assaying:—J. T. King.

Departments 2-8, IV Year; 3 hours per week; second term.  
An advanced laboratory course in which some of the methods of  
course 47 are used.

### 49. Assaying:—J. T. King.

Department 6, III Year; 3 hours per week; one term.  
An introductory laboratory course for Chemical Engineers. Some  
lecture instruction is given. An abbreviation of courses 45  
and 46.

### 50. Mining:—H. E. T. Haultain and F. C. Dyer.

Department 2, I Year; 3 hours per week; second term.  
A laboratory course, including some lectures, being an introduction  
to certain mining and milling machinery and methods.

### 51. Mining:—H. E. T. Haultain.

Department 2, II Year and Department 8, III Year; 1 hour per  
week; first term.  
An introductory course of lectures.

### 52. Mining:—H. E. T. Haultain.

Department 8, III Year; 1 hour per week; second term.  
An extension of No. 51.

### 53. Mining:—F. C. Dyer.

Department 2, II Year; 3 hours per week; one term.  
Continuation of No. 50. Rock drills, sampling methods, use of  
explosives.

### 54. Mining:—H. E. T. Haultain and F. C. Dyer.

Department 2, III Year; 2 hours per week; second term.  
Principles of mining.

### 55. Mining:—H. E. T. Haultain.

Department 2, IV Year; 1 hour per week; both terms.  
Special problems, estimates, reports.

### 56. Mine Cost Keeping and Management:—H. E. T. Haultain.

Department 2, IV Year; 1 hour per week; both terms.  
One of the fundamental features that must not be lost sight of by  
the Mining Engineer is, that his work is designed primarily for  
purposes of financial profit. This course of lectures deals with

details from this point of view. The total cost of a ton of ore requiring as it does an understanding of the problems of amortization, is first dealt with in a broad way. Then are considered various problems of cost keeping, leading on to problems of time and motion study which are essential to the development of the fine points of the art in any particular mining problem. The latter part of the course deals with problems of management, the relations of members of the staff to each other, and the relations of the staff to labour.

57. *Ore Dressing*:—H. E. T. Haultain.

Department 2, II Year; 1 hour per week; first term.  
An introduction to the study of Ore dressing.

58. *Ore Dressing*:—H. E. T. Haultain and F. C. Dyer.

Departments 2 and 8, III Year; 1 hour per week; both terms.  
The general principles of Ore dressing.

59. *Ore Dressing*:—F. C. Dyer.

Departments 2 and 8, III Year; 3 hours per week; both terms.  
Work with crushing machinery, principles of crushing and grading, screen analyses, concentration with gravity separation apparatus, etc.

60. *Ore Dressing*:—H. E. T. Haultain and F. C. Dyer.

Departments 2 and 8, IV Year; 1 hour per week; both terms.  
No. 58 continued, study of flow sheets and special problems.

61. *Ore Dressing*:—F. C. Dyer.

Departments 2 and 8, IV Year; 6 hours per week; one term.  
Advanced work with ore dressing appliances, ore testing and check mill runs.

62. *Physics of Ore Dressing*:—H. E. T. Haultain and F. C. Dyer.

Department 2, III Year; 1 hour per week; both terms.

Ore dressing methods involve a study of the laws governing the phenomena of surface tension, capillarity and colloidal solutions, in addition to those of hydrostatics and certain phases of hydraulics. This is embodied in a special course of lectures in conjunction with laboratory work in the Ore dressing laboratory.

63. *Theory of Measurement*:—H. E. T. Haultain.

Department 2, II Year; 1 hour per week; one term.

This title is not an entirely suitable one for this course of lectures because it is generally applied to a study of the philosophy of extremely accurate measurements. The Mining Engineer has to continually make satisfactory use of measurements with a wide range of inaccuracy. This course of lectures deals with the

philosophy underlying the causes of these errors and the practical application of such approximations. The opportunity is taken in these lectures to deal with the subject of illustrating measurements by graphs.

**64. *Introductory Research:***—H. E. T. Haultain and F. C. Dyer.

Department 2, III Year; 3 hours per week; second term.

This is a laboratory course including some lectures and is a preparation for the thesis of the fourth year.

**65. *Thesis.***

Department 2, IV Year; 7 hours per week; first term; 10 hours per week, second term.

Thesis in this department consists mainly in reports on original work done in the laboratories. In the III year the subject "Introductory Research" paves the way for the thesis. During the month of October the student decides on the subject of his thesis in consultation with his professors. After this is decided the student uses his own initiative in the development of his work.

The thesis is divided into three parts. The first part, which is handed in during the first week in November, contains the title, a statement of what the title is meant to convey and an outline of the work that is proposed to be done. The second part is handed in during the first week of January and contains a report of progress to date and enables the professor in charge to keep in closer touch with the work. The third and final part is handed in a week before the examinations and is a report of progress to date with final conclusions. The three parts combined constitute the thesis.

**66. *Vacation Letters.***

Department 2, III Year and IV Year.

These are a series of letters written during the summer vacation, dealing with various aspects of a mining engineer's work. They are intended to direct and help the student's powers of observation, analysis and criticism as well as being exercises in the art of lucid technical expression. See page 20 for instructions.

**67. *Vacation Work.***

Department 2, II Year.

See page 20 for detailed instructions.

## ASTRONOMY AND GEODESY

**71. *Astronomy, Elementary:***—C. A. Chant.

Department 1, II Year; 1 hour per week, both terms.

A course in descriptive Astronomy, explaining the ordinary astronomical terms, and describing the various celestial bodies and their motions. In the evenings opportunity will be given for identifying the stars and for observing with telescopes.

Text book:—Manual of Astronomy—C. A. Young.

**72. *Astronomy and Geodesy:***—L. B. Stewart.

Department 1, III Year; 2 hours per week.

The course of lectures deals with the determination of time, latitude, longitude and azimuth, by methods adapted to the use of the surveyor's transit and the sextant. It is designed to fulfil the requirements of the final examinations for Ontario and Dominion Land Surveyors.

In Geodesy an account is given of the principles and methods of a secondary triangulation survey, also of the principles involved in the North-West system of survey.

Text books:—Practical Astronomy as applied to Geodesy and Navigation—Doolittle; Nautical Almanac, 1923.

**73. *Field Work:***—L. B. Stewart, S. R. Crerar.

Department 1, III Year; about 2 hours per week, first term.

The practical work in this subject comprises observations in the field with the transit and sextant for the determination of time, latitude and azimuth by the methods described in the lectures.

**74. *Astronomy (Advanced):***—L. B. Stewart.

Department 1, IV Year; 2 hours per week.

The lecture course in this subject comprises the theory and adjustment of the instruments used in connection with a geodetic survey; the methods of taking and reducing observations for time, longitude, latitude, and azimuth, with the precision required on such a survey; and other matters relating to these subjects.

**75. *Geodesy and Metrology:***—L. B. Stewart.

Department 1, IV Year; 2 hours per week.

The lecture course includes a description of the methods of measuring base lines and the angles of a triangulation; the geometry of the spheroid with applications to geodetic problems; the computation of geodetic positions; the solution of large triangles on the earth's surface, and the adjustment of a triangulation; trigonometric and precise spirit levelling; the determination of the figure of the earth by arc measurements, and by the pendulum; the theory of map projections, etc.

76. *Astronomy, Geodesy and Metrology*:—L. B. Stewart.

Department 1, IV Year; about 23 hours per week.

The practical work in the above subjects includes the observation of meridian transits for time and longitude determinations, and of prime vertical transits for latitude, with the astronomical transit instrument; the observation of meridian zenith distances of stars, and of azimuths at elongation for latitude, with the alt-azimuth; theodolite observations for azimuth; observations for latitude with the zenith telescope; the investigation of the constants of the instruments used, and the reduction of all observations; the measurement of a base line with the steel tape and with invar wires, and the determination of the constants of the tape; the measurement of the angles of a triangulation and the adjustment of the angles of network of triangles, etc.

## BIOLOGY

80. *Elementary Biology*:—J. H. Faull.

Department 6, I Year; 3 hours per week, each term.

An elementary laboratory course on the nature and identification of plant and animal tissues and products, with microscope practice.

81. *Elementary Biology*:—E. M. Walker.

Department 1<sub>b</sub>, IV Year.

A special Course of Laboratory work and demonstrations in General Biology, five hours per week, first term.

82. *Hygiene and Bacteriology*:—J. G. Fitzgerald, R. D. Defries.

Departments 1<sub>b</sub> and 6, IV Year.

- (1) This is a course of twenty-five lectures, dealing with the principles of Hygiene and Sanitary Science and including a discussion of the facts in Bacteriology which are necessary for a proper understanding of Hygiene and Sanitary Science. The particular phases of the subject which are of importance from the standpoint of Sanitary Engineering are dealt with.
- (2) This is a laboratory course of six hours per week, second term, dealing especially with the Bacteriology of water, milk and sewage.

## CHEMISTRY

85. *Elementary Chemistry*:—E. G. R. Ardagh.

All Departments, I Year; 2 hours per week, first term; 1 hour per week, second term.

A lecture course in elementary chemistry dealing with the metals and non-metals, with experimental illustrations.

**86. Inorganic Chemistry:**—L. J. Rogers.

Department 6, I Year; 10 hours per week, both terms.

A laboratory course of quantitative experiments illustrating the use of the sensitive balance, and confirming the fundamental laws of chemistry; qualitative inorganic analysis; quantitative analysis of pure salts; inorganic preparations; molar weight determinations. Text book:—Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

**87. Inorganic Chemistry:**—E. G. R. Ardagh.

Departments 2, 6 and 8, II Year; 1 hour per week, first term.

A lecture course on the chemistry of the metals; a continuation of Course 85.

**88. Analytical Chemistry:**—L. J. Rogers.

Departments 2, 6 and 8, III Year; 1 hour per week, both terms.

A lecture course on the principles of chemical analysis; select gravimetric and volumetric methods; technical analysis.

**89. Analytical Chemistry:**—E. G. R. Ardagh.

Departments 1, 2, 3 and 7, II Year; 3 hours per week.

Laboratory practice in elementary qualitative and quantitative analysis.

Text book:—A Smaller Chemical Analysis—Newth.

**90. Analytical Chemistry:**—J. W. Bain.

Department 2, II Year; 3 hours per week, both terms.

A laboratory course in the gravimetric determination of metals and acids, with elementary volumetric analysis.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

**91. Analytical Chemistry:**—L. J. Rogers.

Department 8, II Year; about 12 hours per week.

A laboratory course comprising gravimetric and volumetric methods, acidimetry and alkalimetry.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

**92. Analytical Chemistry:**—L. J. Rogers.

Department 6, II Year; 10 hours per week, first term; 12 hours per week, second term.

A laboratory course in qualitative and elementary quantitative chemical analysis; inorganic preparations.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

93. *Engineering Chemistry*:—J. W. Bain.

Departments 1, 3, 6, 7, and 8, II Year; 1 hour per week; second term.  
A lecture course consisting of a study of the industrial production and application of heat and light, and of the chemistry of fuel and the products of combustion.

94. *Industrial Chemistry*:—J. W. Bain.

Department 6, II Year; 1 hour per week, both terms.  
A lecture course on the manufacture of salts, acids, alkalies and inorganic chemicals.

95. *Organic Chemistry*:—M. C. Boswell.

Departments 1, 2, 3 and 7, II Year; 1 hour per week, second term.  
A lecture course in elementary organic chemistry.

96. *Organic Chemistry*:—M. C. Boswell.

Department 6, II Year; 2 hours per week, both terms.  
A lecture course dealing with the aliphatic compounds.

97. *Organic Chemistry*:—M. C. Boswell.

Department 6, II Year; 60 hours.  
A laboratory course in organic preparations.

98. *Physical Chemistry*:—F. B. Kenrick.

Departments 6, II Year; 2 hours per week, both terms.  
A course of lectures on the elements of chemical mechanics, and the theory of solutions.

99. *Analytical Chemistry*:—E. G. R. Ardagh.

Department 2, III Year; 3 hours per week, first term; 6 hours per week, second term.  
A laboratory course on the technical analysis of ores and furnace products.

100. *Industrial Chemistry*:—E. G. R. Ardagh.

Department 6, III Year; about 10 hours per week.  
A laboratory course in industrial chemistry

101. *Analytical Chemistry and Phase Rule*:—L. J. Rogers, J. T. Burt-Gerrans.

Department 8, III Year; about 6 hours per week.  
A laboratory course in analysis and phase rule.

102. *Engineering Chemistry*:—J. W. Bain, E. G. R. Ardagh.

Departments 1, 2, 3, 6 and 7, III Year; 1 hour per week, both terms.  
A lecture course on the application of chemistry to engineering problems; air, water, sewage, the materials of construction, explosives, etc.

103. *Industrial Chemistry*:—E. G. R. Ardagh.  
Department 6, III Year; 1 hour per week, both terms.  
A lecture course on petroleum and its products, coal tar and its products; fats, oils, soap, sugar, starch, and gums; fermentation industries, etc.
104. *Chemical Plant*:—J. W. Bain.  
Department 6, III Year; 1 hour per week, both terms.  
A lecture course on the machinery and plant used in chemical manufacturing.
105. *Organic Chemistry*:—M. C. Boswell.  
Department 6, III Year; 2 hours per week, both terms.  
A lecture course on the aromatic series.
106. *Organic Chemistry*:—M. C. Boswell.  
Department 6, III Year; 85 hours.  
A laboratory course in organic preparations in the aromatic series.
107. *Electrochemistry*:—W. L. Miller.  
Departments 6, 7 and 8, III Year; Department 2, IV Year; 2 hours per week, first term.  
A lecture course on elementary electrochemistry, illustrated by experiments.
108. *Electrochemistry*:—W. L. Miller and J. T. Burt-Gerrans.  
Departments 6, 7 and 8, III Year; 3 hours per week, first term.  
Department 2, IV Year.  
A laboratory course in quantitative measurements to accompany Course 101.
109. *Inorganic Chemistry*:—J. W. Bain.  
Department 6, IV Year; 1 hour per week, first term; 2 hours per week, second term.  
A lecture course on chemical theory.
110. *Organic Chemistry*:—M. C. Boswell.  
Department 6, IV Year; 1 hour per week, both terms.  
A lecture course on advanced organic chemistry.
111. *Organic Chemistry*:—M. C. Boswell.  
Department 6, IV Year.  
A laboratory course in advanced organic chemistry.
112. *Industrial Chemistry*:—J. W. Bain.  
Department 6, IV Year; 1 hour per week, both terms.  
A lecture course on selected subjects in chemical technology.
113. *Industrial Chemistry*:—J. W. Bain, E. G. R. Ardagh, M. C. Boswell.  
Department 6, IV Year.  
A laboratory course in industrial problems.

**114. *Electrochemistry:*—J. T. Burt-Gerrans.**

Department 6, 7 and 8, IV Year; 2 hours per week, both terms.

An advanced lecture course on the theory of solutions and electrolysis, and the application to the practice of electro-deposition and electrolytic refining of metals. The course also includes lectures on the electric furnace with special consideration of efficiency.

Text books:—Electrometallurgy—Borchers; Electrochemistry—Le Blanc; Electrochemistry—Luepke.

**115. *Electrochemistry:*—W. L. Miller and J. T. Burt-Gerrans.**

Departments 6, 7 and 8, IV Year.

A laboratory course accompanying Course 114.

**116. *Sanitary and Forensic Chemistry:*—J. W. Bain.**

Department 6, IV Year; 1 hour per week, both terms.

A lecture course on the composition and examination of air, water and food; poisons and their detection, with accompanying laboratory course.

**117. *Sanitary Chemistry:*—E. G. R. Ardagh.**

Department 1b, IV Year.

A lecture and laboratory course on water supply, sewerage disposal ventilation, etc.

## ECONOMICS AND BUSINESS ADMINISTRATION

**121. *Business:*—**

Departments 1, 2, 3, 6, 7, 8, I Year; 1 hour per week, second term.

A lecture course on the principles underlying accounting and general business methods of a simple nature in order to enable the student to understand simple financial reports.

**122. *Technical English:*—S. G. Bennett.**

All Departments, I Year; 1 hour per week, both terms.

A lecture course on the expression of ideas and the compilation and writing of different types of engineering reports; technical exposition; the derivation and use of technical terms; the necessity of accurate expression in professional writing; terminology; the use of graphic methods for presenting facts; abbreviations; numbers; symbols.

**123. *Economics and Finance:*—C. R. Fay.**

All Departments, II Year; 1 hour per week, both terms.

An introduction to the study of Economics. The course will deal in an elementary fashion with the following:

- (1) Scope and Method of Economics.
- (2) Theory of Value and Distribution.
- (3) Structure of Industry and Social Conditions.
- (4) Money, Banking and Public Finance.

Text Book:—Economics for the General Reader—Clay.

**124. Commercial Law:**—A. R. Clute.

All departments, III Year; 1 hour per week, both terms. General Principles of the Law of Contracts, Principal and Agent, Partnership and Limited Companies (with special reference to the Companies Acts). General view of the following:—Negotiable Instruments, Sale of Goods, Bills of Sale and Chattel Mortgages, Suretyship and Guarantee.

Text-Book:—Stephens' Elements of Mercantile Law (5th Ed., 1911.)

**125. Engineering Economics:**—C. R. Young.

Departments 1, 3, 7, 8, IV Year; 1 hour per week, second term.

A series of lectures on the principles by which the economic practicability of a project is judged and the comparison of competing proposals is made. Consideration is given to first cost and annual cost, methods of estimating, fixed charges and operating expenses, valuation and appraisals. Special attention is given to depreciation and the methods of providing for it, as well as to its relation to amortization. Typical numerical problems are discussed and solved.

Text Books:—Engineering Economics—Fish; Financial Engineering —Goldman.

**126. Engineering Law:**—

Department 1, IV Year; 1 hour per week, first term.

A course of lectures, co-ordinating Engineering practice and Law as contained in various legislation such as: The Railway Act, Municipal Act, Public Health Act, Arbitration Act, Workmen's Compensation Act, Patents, Copyrights, etc.

**127. Contracts and Specifications:**—C. R. Young.

Departments 1, 4, 8, IV Year; 1 hour per week, second term.

This course of lectures deals with the fundamental principles of contract and specification writing. The critical examination of typical specifications and agreements by the class, forms an essential feature of the instruction.

Text Books:—Engineering Contracts and Specifications—Johnson; Elements of Specification Writing—Kirby.

**128. Management:**—C. R. Young.

Department 1, IV Year; 1 hour per week, first term.

A series of lectures dealing with the fundamental principles upon which management is based. The possibilities of effective management are indicated and its basis is shown to exist in favourably operating conditions, suitable organization and smooth administration. Consideration is given to such matters as selection of personnel, essentials of effective organization for enterprises of widely different character and the art of directing a force so as to attain a desired end in an expeditious and effective manner.

**Text Books:**—Principles of Industrial Organization—Kimball; Administration of Industrial Enterprises—Jones.

129. *Plant Management:*—G. A. Guess.

Department 8, IV Year; 1 hour per week, first term.

A course of twelve lectures dealing with some phases of labour, plant organization, smelter contracts and markets.

130. *Shop Management and Costs:*—E. A. Allcut and H. W. Price.

Departments 3, 6, and 7, IV Year; 1 hour per week, both terms.

131. *Railway Economics:*—W. M. Treadgold.

Department 1, Option e, IV Year; 2 hours per week, both terms.

The object of this course is to make the student acquainted with the general principle of railroad engineering and the following branches of the subject will be discussed—economic theory of location, train resistance, effect of grade, distance and curvature, rise and fall, maintenance of way, yards and terminals, tunnels and street railway practice.

132. *Municipal Administration:*—P. Gillespie, A. T. Laing.

Department 1, Option b, IV Year; 1 hour per week, both terms.

A course of lectures dealing with civics, local improvement laws and assessments, building codes, fire control, transportation, public utilities, etc.

133. *Public Speaking:*—

Department 1, III Year; 1 hour per week, first term.

A course on the principles of public speaking and the means of expression accompanied by practical application and training in actual speaking.

## ELECTRICITY

(*Subject matter and arrangement of lectures and laboratory courses is in process of revision for session 1922-23.*)

135. *Electricity:*—H. W. Price.

Departments 1, 2, 3, 6, 7 and 8, I Year; 2 hours per week, both terms.

A course of lectures on basic principles relating to electric circuits, magnetic circuits, instruments and apparatus in general, distribution of electrical energy, etc., illustrated largely from commercial apparatus. The point of view of this work is quantitative rather than descriptive, for it is believed that men who can solve engineering problems are most likely to grasp underlying principles.

136. *Electricity:*—W. S. Guest.

Departments 3, 6, 7 and 8, II Year; 2 hours per week, both terms.

Deals with the theory of electrical measurements, and detailed study of various methods applicable under different conditions in engi-

neering practice to the measurement of resistance, current, potential difference, power and energy; calibration of commercial measuring instruments. The effect of choice of conditions of measurement on the accuracy of the result is considered.

137. *Electrical Laboratory:*—W. S. Guest.

Departments 3, 6, 7 and 8, II Year; 3 hours per week, both terms.

This laboratory course is closely associated with the lecture course 136 on electricity for the second year. The more important and useful methods of testing generators and circuits for electromotive force, resistance, current, grounds, etc., are practiced, often under conditions such as occur in practice. The work also includes methods of calibration of measuring instruments for voltage, current, power and energy, and certain studies of properties of incandescent lamps.

138. *Magnetism and Electricity:*—T. R. Rosebrugh.

Department 3, III Year; 2 hours per week, first term.

Department 7, III Year; 2 hours per week, both terms.

A course of lectures on theory of magnetism and magnetic circuits, theory of direct-current generators, motors, etc.

139. *Alternating Current:*—T. R. Rosebrugh.

Departments 3 and 7, III Year; 1 hour per week.

A first course of lectures on alternating current, covering principles of measurement and leading to the analytical and graphical treatment of the simpler problems relative to alternating-current circuits and machinery.

140. *Electrical Laboratory:*—A. R. Zimmer.

Department 3, III Year; 3 hours per week; Department 7, III Year; 6 hours per week.

This laboratory course is intended to afford the student an opportunity to become familiar with principles involved in continuous-current shunt, series and compound-wound generators and motors, and, to some extent, alternating-current circuits and machinery. Other sections of the work deal with the magnetic properties of iron and steel, and study of iron losses in transformers and generators.

The course is arranged to stand in close relation to the lecture courses in the subjects of magnetism and electricity and alternating current (138, 139) for III Year, and to certain design work (141).

141. *Electrical Design:*—H. W. Price.

Department 7, III Year; 1 hour per week.

A course of lectures dealing with design of electrical apparatus and machinery, accompanied by designs to be worked out in the design room.

142. *Electrical Design:*—H. W. Price.

Department 7, III Year; 3 hours per week

A design room is set apart for working out designs of electrical apparatus such as transformers, generators, motors, auxiliary apparatus, etc.

Special forms and notes are employed, arranged to suit the various studies. Certain models are provided to assist where necessary.

143. *Electricity:*—H. W. Price.

Departments 1, 2 and 8, III Year; 1 hour per week, both terms.

A continuation of Course 135, First Year, adapted to the requirements of non-electrical students. It deals with problems on direct-current circuits and apparatus; magnetic circuits; power measurements; alternating current principles and machinery; transmission; power-plants, etc.

144. *Electrical Laboratory:*—H. W. Price, A. R. Zimmer.

(a) Department 1.

III Year; 3 hours per week, first term.

IV Year; Option d, e, 3 hours per week, second term.

(b) Department 2.

IV Year; 3 hours per week, first term.

(c) Department 3.

IV Year; 3 hours per week, second term.

(d) Department 6.

III Year; 3 hours per week, first term.

(e) Department 8.

III Year; 3 hours per week, both terms.

These courses are arranged to suit the requirements of the departments concerned. The experiments are planned with the idea of affording a general knowledge of circuits, power measurements, direct-current and alternating current machinery and transmission of power.

145. *Applied Electricity:*—T. R. Rosebrugh and H. W. Price.

Department 7, IV Year; 4 hours per week.

This course deals by analytical and vector methods with the theory of alternating-current circuits and machinery. Applications of theory are considered with regard to transformers, single and polyphase generators, synchronous motors and rotary converters, induction and commutating series motors, transmission lines, wave analysis, etc.

146. *Electrical Laboratory:*—A. R. Zimmer.

Department 7, IV Year, in connection with 145; 20 hours per week.

This laboratory course involves a thorough study of principles and properties of single and polyphase circuits and apparatus. Both vector and analytical methods are applied to the solution of problems based on tests made on laboratory machines.

The work deals mainly with constant-voltage and constant-current transformers, single and polyphase alternators, synchronous motors, rotary converters, induction and single phase commutating motors, transmission line, etc. The work does not consist only of factory tests, but is designed to lead the student to apply theory to practice as illustrated in the apparatus under test, with a view to an exact understanding of methods and an appreciation of limitations under many conditions. Free use is made of the oscillograph as a necessary device for "seeing" conditions under investigation. The best commercial measuring instruments are available.

## ENGINEERING DRAWING AND DESCRIPTIVE GEOMETRY

### 160. *Descriptive Geometry*:—J. R. Cockburn.

Departments 1, 2, 3, 6, 7 and 8, I Year; 1 hour per week; both terms. This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solutions of problems relating to straight lines and planes.

### 161. *Descriptive Geometry*:—J. R. Cockburn.

Department 4, I Year; 1 hour per week; both terms.

This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solution of problems relating to straight lines and planes, special reference being made to the determination of shades and shadows.

### 162. *Descriptive Geometry*:—J. R. Cockburn.

Departments 1, 2, 3, 7 and 8, II Year; 1 hour per week, both terms. This course of lectures is a continuation of the work taken in the first year with the following additions: Problems relating to curved surfaces, principles of shades, shadows and perspective.

### 163. *Descriptive Geometry*:—J. R. Cockburn.

Department 4, II Year; 1 hour per week, both terms.

This course of lectures is a continuation of the work taken in the First Year with the addition of problems relating to curved surfaces, shades, shadows and perspective.

### 164. *Descriptive Geometry*:—J. R. Cockburn.

Department 1, III Year; 1 hour per week, first term.

This course of lectures deals with spherical projections, the principles of mapmaking, and the graphical solution of spherical triangles.

70 UNIVERSITY OF TORONTO CALENDAR 1922-1923

165. *Descriptive Geometry*:—J. R. Cockburn.  
Department 4, III Year; 1 hour per week, first term.  
Advanced work in shades, shadows and perspective.
166. *Engineering Drawing*:—J. R. Cockburn.  
Departments 1, 2, 3, 7 and 8, I Year; 11 hours per week, first term; 18 hours per week, second term.  
Copying from the flat, lettering, topography; graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; the plotting of original surveys; measured drawings.
167. *Architectural Drawing*:—J. R. Cockburn, H. H. Madill.  
Department 4, I Year; 9 hours per week first term; 18 hours per week, second term.  
Copying from the flat, lettering, rendering the graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; measured drawings.  
Elements and principles of Architecture.
168. *Engineering Drawing*:—J. R. Cockburn.  
Department 6, I Year; 4 hours per week, both terms.  
Copying from the flat, lettering, graphical solution of problems in statics, problems in descriptive geometry
169. *Engineering Drawing*:—J. R. Cockburn.  
Departments 1 and 2, II Year. Department 1,  $4\frac{1}{2}$  hours per week, first term;  $13\frac{1}{2}$  hours per week, second term. Department 2, 3 hours per week first term; 12 hours per week, second term.  
Colouring and shading as applied to both topographical and construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics and strength of materials; measured drawings; elementary design.
170. *Engineering Drawing*:—J. R. Cockburn.  
Departments 3 and 7, II Year; Department 3, 13 hours per week, first term; 11 hours per week second term; Department 7, 12 hours per week, both terms.  
Coloring and shading as applied to construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics, theory of mechanism and strength of materials; measured drawings; elementary design.
171. *Architectural Drawing*:—J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.  
Department 4, II Year; 17 hours per week, both terms.

Exercises from the orders of architecture; principles of shades, shadows and perspective; elementary architectural design; problems in descriptive geometry relating to solids bound by curved surfaces; solution of problems in optics and strength of materials; measured drawings.

172. *Engineering Drawing*:—J. R. Cockburn.

Department 6, II Years; 7 hours per week, first term; 3 hours per week, second term.

Department 8, II Year; 3 hours per week, first term; 6 hours per week, second term.

(Same as Department 3 with the exception that Dept. 6 has no descriptive geometry.)

173. *Engineering Drawing*:—J. R. Cockburn, C. R. Young.

Department 1, III Year; 15 hours per week first term; 12 hours per week, second term.

Principles of mapmaking, spherical projection, plotting of original surveys relating to topographical and railway work; problems in theory of construction; original design of various structures; measured drawings.

174. *Engineering Drawing*:—J. R. Cockburn.

Department 2, III Year; 9 hours per week, first term.

Plotting of original surveys, relating to topographical and railway work and mining; problems in theory of construction; original design; measured drawings.

175. *Architectural Drawing*:—J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.

Department 4, III Year; 18 hours per week, both terms.

Architectural design; advanced work in monochrome and colours; problems in shades, shadows and perspective; problems in theory of construction, including framed structures.

176. *Architectural Drawing*:—J. R. Cockburn.

Department 4, III Year; 1 hour per week, first term.

Advanced work in shades, shadows and perspective.

177. *Engineering Drawing*:—J. R. Cockburn, C. R. Young.

Departments 3, 6 and 8, III Year; Department 3, 9 hours per week, first term; Department 6, 6 hours per week, first term; Department 8, 3 hours per week, first term.

Problems in design dealing with the theory of structures.

178. *Structural Design Drawing*:—C. R. Young, W. J. Smither.

Department 1, IV Year; 22 hours per week, both terms.

Problems in structural design.

179. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Department 1, IV Year; 4 hours per week, first term; 8 hours per week  
 second term.  
 Problems in structural design.
180. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Departments 3 and 4, IV Year; 3 hours per week, both terms.  
 Problems in mill building design.
181. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Department 3, IV Year; 4 hours per week, first term; 6 hours per week,  
 second term.  
 Problems in structural design.

### ENGINEERING PHYSICS

185. *Illuminating Engineering and Optics*:—G. R. Anderson.  
 Departments 1, 3, 7, I Year;  
 Rectilinear propagation of light, illumination, photometry, light standards. Distribution of light by reflectors and diffusers, general and selective absorption, economic values of artificial lights. Illumination calculations.  
 Laws of reflection and refraction, theory of optical instruments.  
 Light considered as wave motion, dispersion, spectrum analysis, colour phenomena, polarization.  
 Lectures and laboratory work, both terms.
186. *Hydrostatics*:—G. R. Anderson.  
 Departments 1, 3, 6, 7, II Year.  
 Laws of fluid pressure and application to machines. Density of solids, and fluids, theory of flotation.  
 Lectures and laboratory work. Spring term.
187. *Heat*:—G. R. Anderson.  
 Departments 1, II Year.  
 Generation and propagation of heat. General and industrial thermometry, calorimetry and pyrometry. Linear and cubical expansion, gas laws. Specific heat of solids, liquids and gases, latent heat of fusion and vaporization. Mechanical equivalent of heat. Carnot cycle.  
 Lecture and laboratory work, Fall term.
188. *Photography*:—G. R. Anderson.  
 Department 1, II Year.  
 The camera and its adjustments, lenses, shutters, screens. Plates for various purposes, films, prevention of halation. Lighting, exposure, development. Paper of various kinds, printing, enlarg-

ment and reduction, blue printing and allied processes. Record photography, photogrammetry and photo-surveying. Photography in colour.

Lectures Fall term, and laboratory work both terms.

**189. *Illumination*:**—G. R. Anderson.

Department 4, II Year.

Principles of interior and street illumination. Artificial lighting of public and private buildings, etc.

**190. *Acoustics*:**—G. R. Anderson.

Department 4, III Year.

Wave motion, propagation, reflection and transmission of sounds.

Laws of vibrating strings, pipes and forks. Velocity of sounds.

Musical scales. Absorption of sound by various substances, use of deadening material in buildings. Amount of reverberation permissible and desirable in public buildings. Lectures and laboratory work.

**191. *Photographic Surveying*:** G. R. Anderson.

Department 1a, IV Year; 1 hour lecture and 2 hours laboratory, first term.

This course presupposes a general knowledge of photographic processes as given in the second year. Treatment of a photograph as a perspective drawing from which plan and elevation to scale may be obtained under certain conditions. The intersection method of photographic surveying, its advantages and limitations. The stereoscopic method with its advantages and disadvantages. Method of plotting. Accuracy of results.

## GEOLOGY

**195. *Geology (Elementary)*:**—W. A. Parks.

Departments 1, 2, II Year; 2 hours per week, second term.

This course deals chiefly with historical geology with special reference to Canadian formations.

Reference books:—Introduction to Geology—Scott; Text Book of Geology—Dana.

**196. *General Geology*:**—A. MacLean.

Department 8, II Year; 2 hours per week, both terms.

Lecture and laboratory work on Historical, Structural and Economic Geology, designed to familiarize the student with the more important principles, facts and terms of general geology.

197. *Engineering Geology*:—A. MacLean.

Department 1, III Year; 1 hour per week, both terms.

This course deals with the application to Engineering of Dynamic, Structural and Economic Geology.

198. *Economic Geology* (including Dynamic and Structural Geology):—  
A. P. Coleman.

Department 2, III Year; 1 hour per week, first term; 2 hours per week, second term.

A study of the more important economic rocks, minerals and ores with their geological associations. Special attention paid to Canadian deposits.

199. *Advanced Geology*:—A. P. Coleman.

Department 2, IV Year; 2 hours per week, both terms.

*Pre-Cambrian Geology*.—An account of the Keewatin, Huronian and Laurentian rocks of Canada, with their distribution, structural relations and economic features, and briefer accounts of similar formations in the United States and elsewhere.

Works of Reference:—Reports of the United States and Canadian Geological Surveys, of the Bureau of Mines of Ontario, etc.

*Pleistocene Geology*.—Lectures on the formation and distribution of the drift deposits of North America, with brief references to other regions. Glacial, Interglacial and Postglacial beds are described, changes of climate are discussed with their probable causes, and the economic features of the clays, sands and gravels are pointed out. A weekly excursion is made during October and November to points of interest near Toronto, which is the centre of the most important development of Pleistocene in America.

*Physiography*.—A course of lectures on the surface forms of the earth, with the geological factors which have produced them. The broad features of the earth, its plains, tablelands, hills, valleys, mountains, oceans, rivers and lakes are discussed in a general way, methods of topographical surveys and mapping are referred to, and the chief physiographic areas of Canada are described.

200. *Mining Geology*:—A. P. Coleman.

Department 2, IV Year; 1 hour per week, both terms.

A course of lectures on geological problems associated with mining, typical mining regions in Canada, the United States and elsewhere being discussed from the geological side.

Works of reference:—Mineral Industry and the books mentioned under (A).

201. *Geological Excursions*:—A. P. Coleman.

Department 2, IV Year.

Trips to points of interest in the vicinity of Toronto.

202. *Ore Deposits*:—A. P. Coleman.

Department 2, III Year; 1 hour per week, both terms.

Discussion of the origin and classification of ore deposits in a general way, the mode of occurrence of the chief metals, and statistics of production, special attention being given to the metals mined in Canada.

203. *Economic Geology*:—Alex. MacLean.

Department 2, III Year; 2 hours per week, second term.

Laboratory work on ores, manner of occurrence, vein structure, etc.  
Geological maps of typical mining regions.

204. *Special Geology*:—A. MacLean.

Department 1, Option e, IV Year; 1 hour lecture and  $1\frac{1}{2}$  hour laboratory per week, second term.

A lecture and laboratory course on Superficial Geology, Physiographic Control, Water Geology, etc.

## HYDRAULICS

205. *Hydraulics*:—R. W. Angus.

Departments 1, 2, 3, 6, 7, III Year; 2 hours per week, both terms.

This is a course of lectures in hydraulics devoted to the development and discussion of formulae relating to the flow of water in pipes, the measurement of discharge by various methods, such as orifices and weirs, the conditions of flow obtaining in open channels, artificial and natural, and in pipes flowing partially full, together with other kindred subjects.

The object of this course is to provide the student with a good working knowledge of the fundamental principle of hydraulics, such as is useful in practical work, and is necessary to the intelligent investigation of more advanced problems, such as the design of water supply, sewerage and irrigation system, and water power plants.

206. *Hydraulic Laboratory*:—R. W. Angus, R. Taylor.

Departments 1, 3, III Year; one 3 hour period per week, second term.

Departments 6, 7, III Year; 4 periods of 3 hours each.

The work in this course is intended to illustrate the lecture course given in hydraulics and to give the student some working acquaintance with the formulae met with in practice. Experiments are made to determine the coefficients for orifices of the various types used in practice and for a weir. The results of these experiments are used in measuring the discharge in subsequent experiments on meters and for the determination of hydraulic resistances in various cases of flow in pipes. The complete course illustrates very fully the application of the course of lectures to actual cases.

**207. *Hydraulics:***—R. Taylor.

Departments 1, 3, 7, IV Year; 1 hour per week, both terms.

A study of the collection of stream flow data is followed by an investigation of precipitation and evaporation and their relation to run-off. The application of this information to the design of irrigation works is discussed in some detail and also a problem on the design of a complete hydraulic power plant, including the canal, is worked out, and this is supplemented, where possible, by a problem on an irrigation system. Application of the work is also made to the design of such a problem as is presented by a storm sewer.

**208. *Hydraulics:***—R. W. Angus.

Departments 1, 3, 7, IV Year; 2 hours per week, both terms.

The most important question considered and to which most of the lectures are devoted is the theory of turbines and centrifugal pumps, the effect of the design on the speed, discharge power and efficiency being fully taken up. This course also includes some of the problems mentioned in the previous course, such as the proper selection of irrigation pumps, water turbines, etc.

**Text Books:**—Centrifugal Pumps—Daugherty Water Power Engineering—Mead.

**209. *Hydraulics:***—R. W. Angus, R. Taylor.

Departments 1, 3, 7, IV Year; about 10 hours per week in 3 hour periods.

A laboratory course devoted to experimental work on turbines of various types and centrifugal and turbine pumps and other similar devices. This experimental work is arranged to illustrate the lectures on turbine and pump design. The experiments are made on two large turbine pumps used in the laboratory supply, as well as on apparatus specially designed for instruction. Various methods of measuring water-power and the efficiency of machines are also given. A list of the equipment now available, and which is used in this course, is given at the end of the Calendar.

**210. *Hydraulic Laboratory:***—R. Taylor.

Department 2, 8, IV Year; Eight 3 hour periods.

A laboratory course of experiment on orifices, weirs and meters.

**211. *Hydraulics:***—R. Taylor.

Department 1<sub>b</sub>, 1<sub>e</sub>, IV Year, one hour lecture per week, first term.

A laboratory course of 3 hours per week, first term, on measurement of water, flow in open channels and on pumps.

## HEAT ENGINES

216. *Steam Engines:*—E. A. Allcut.

Departments 3, 7, II Year; 1 hour per week, both terms.

Departments 2, 8, II Year; 1 hour per week, one term.

This course of lectures includes a discussion of the principles of action of the steam engine; also the theory and design of various simple forms of valve gears used in the operation of such engines.

217. *Thermodynamics:*—R. W. Angus.

Departments 3, 6 and 7, III Year; 2 hours per week.

A lecture course in which the subject is treated in such a way as to make it of practical value and give a working acquaintance with the principles on which it is based. After the elementary ideas have been given and the proofs of the properties of Carnot's cycle, applications of the subject are made to the perfect gas, air, saturated steam and to the various types of engines.

218. *Heat Engines:*—E. A. Allcut.

Department 3, III Year; 2 hours per week, both terms.

Department 7 and 8, III Year; 1 hour per week, both terms.

This course in heat engines is intended for students in Mechanical, Electrical and Metallurgical Engineering, to be supplementary to the general course of lectures in thermodynamics.

The principal commercial forms of heat engines are dealt with in a more or less descriptive manner; special attention is given to considerations affecting the design of the ordinary forms of steam engines, gas engines and oil engines.

219. *Thermodynamics and Mechanical Laboratory:*—R. W. Angus, H. W. Tuttle.

Department 3, III Year; one 3 hour period per week, both terms.

Department 7, III Year; 2 hours per week, first term;  $1\frac{1}{2}$  hours per week, second term. Time to be in three-hour periods.

This laboratory course is designed to assist in a clearer understanding of thermodynamics, machine design and mechanics of machinery.

The work in thermodynamics consists in the setting of slide valves, indicating engines measuring the brake horse-power, simple engine and boiler tests and the testing of gas and gasoline engines under various conditions. The mechanical laboratory work deals with the efficiency of belts as well as of several machines of simple construction. An examination of lubricating oils is also made by means of well-known methods. Experiments are also made on the balancing of reciprocating and rotating masses.

220. *Thermodynamics:*—R. W. Angus, E. A. Allcut.

Departments 3 and 7, IV Year: 2 hours per week; both terms.

This is a continuation of the introductory course, the subject being here treated from a general standpoint and the idea of entropy

and of the absolute scale of temperatures being introduced. The course includes the treatment of saturated and superheated vapours, gases, the flow of fluids, chimney and boiler efficiency and the theory of various engines and other appliances including air compressors, refrigerating machines, and injectors.

221. *Thermodynamics*:—E. A. Allcut.

Departments 3, 7, IV Year; 1 hour per week, both terms.

Steam Power Plants. This course follows in logical order the courses on heat engines given in the second and third years. In it a study of the prime movers and auxiliary apparatus required in a power plant is made in such a manner as to indicate the proper choice of equipment under conditions of operation.

222. *Thermodynamics*:—R. W. Angus, H. W. Tuttle.

Departments 3 and 7, IV Year; about  $9\frac{1}{2}$  hours per week, in 3 hour periods.

The work in this year is a continuation and extension of the work covered in the third year laboratory course. Careful tests are made of engines of various types, such as simple, tandem and cross-compound steam engines; steam turbines; refrigerating machines; injectors and steam pumps, etc.; and an application is made of Hirn's analysis and the entropy diagram to the results obtained. A complete set of experiments is made on each machine and the result plotted so as to show clearly to the student the effect of various alterations in the adjustment of the engine on the resulting efficiency.

Several modern gas and gasoline engines and a gas producer give ample opportunity for the study of this type of engine, and facilities are provided for sampling the gas supply and exhaust.

Two experimental stacks and three boilers enable results to be obtained on boiler efficiency and chimney draft.

223. *Thermodynamics*:—E. A. Allcut.

Department 1, III Year; one hour per week, both terms; 2 hours per week laboratory, second term, time to be in 3 hour periods.

This course is especially designed to give the student a working knowledge of thermodynamics as applied to the perfect gas and steam so that he will be able to understand clearly the action of air compressors, steam engines, etc. After deducing general principles, the efficiency of compressed air transmission and the relative merits of different types of compressors are discussed. The steam engine and boiler are also discussed.

224. *Thermodynamic Laboratory*:—R. W. Angus.  
 Department 6, III Year; Departments 2, 8, IV Year; 7 three-hour periods.  
 A course of experiments with steam and gas engines, compressed air, etc.
225. *Motive Power*:—R. W. Angus.  
 Department 1, Option e, IV Year; one hour per week, both terms.  
 A course of lectures covering boiler capacity, locomotive horse-power, tractive effort, etc., necessary to carry specified trains over different conditions of roadbed.

### MACHINERY

230. *Theory of Mechanism*:—J. H. Parkin.  
 Departments 2, 3 and 7, II Year; lectures 2 hours per week; problems  $1\frac{1}{2}$  hours per week, both terms.  
 This course of lectures treats of the elementary construction of machines and of the motions of the various parts. Methods of determining linear and angular velocities, methods for the solution of elementary problems involving forces and methods for the determination of the mechanical efficiency of machines are discussed. Velocity diagrams, crank effort and torque diagrams are plotted. Cams, toothed gearing and various types and applications of trains of gearing are considered.  
 Applications of the methods described are made to various machines including engines, machine tools, link motions, etc., and the lecture work is followed up by the solution of numerous examples in the drafting room.  
 Text Book:—Theory of Machines—Angus.
231. *Mechanics of Machinery*:—J. H. Parkin.  
 Departments 3 and 7, III Year; 1 hour per week, both terms.  
 This course is devoted to a consideration of the speed regulation and balancing of machines, and comprises lectures on the theory of various forms of governors, kinetic energy of machines and determination of speed fluctuations, the proper weight of flywheel, acceleration and inertia effects, and balancing.  
 The methods of analysis employed are those developed in course 230.  
 Text Book:—Theory of Machines—Angus.
232. *Elementary Machine Design*:—J. H. Parkin.  
 Departments 3, 6 and 7, II Year; 1 hour per week, both terms.  
 This is a preparatory course intended to familiarize the student with the different shop methods and processes, casting, forging, machining, etc., used in the production of machine parts, to enable him to make proper provision in the design of such parts to facilitate their production.

In addition, the various standards, machine and pipe threads, tapers, pipe fittings, etc., are described and mechanical drafting room practice explained.

Tolerances, limits, fits and gauges are discussed.

The design of simple machine fastenings and parts is taken up and examples worked out in the drafting room.

**233. *Machine Design:***—J. H. Parkin.

Departments 3, 7 and 8, III Year; 2 hours per week, both terms.

Departments 6, IV Year; 1 hour per week, both terms.

The design work occupies 7 hours per week for Department 3,  $4\frac{1}{2}$  hours per week for Department 7 and 3 hours per week, second term only for Departments 3, 6 and 8. The periods are of not less than 2 hours and preferably 3 hours duration.

The lectures in this course deal with the design of various machine elements, including shafting, bearings (journal, thrust, ball and roller), belts, pulleys, flywheels, clutches, springs, machine frames, etc.

The problems worked out in the drafting room are planned to include the design of all of the above and with a view to developing the student's judgment and sense of proportion in design.

Text Book:—Machine Design—Leutwiler.

**234. *Advanced Machine Design:***—J. H. Parkin.

Department 3, IV Year; lectures 1 hour per week, design 5 hours per week (one 2-hour and one 3-hour period), both terms.

The work of this course is devoted to the design of complete machines with the object of giving the student practice not only in the design of various details, but also in working in the various elements into a machine of smooth and harmonious design. The machines chosen as examples for design involve as many new machine elements as possible in order to broaden the training of the student.

Text Book:—Machine Design—Leutwiler.

## MATHEMATICS

**236. *Calculus:***—A. T. DeLury.

All Departments, I Year; 2 hours per week, each term.

Treatment of limits with special reference to those pertaining to exponentials and logarithms. Derivation of the fundamental formulae of the differential and integral calculus, with early application to simple problems concerning graphs, areas, volumes, lengths, etc.

237. *Calculus*:—S. Beatty and J. L. Synge.

Departments 1, 3, 6 and 7, II Year; 1 hour per week, both terms.  
 Continuation of course 236. The elementary theory reviewed and extended. Special attention to applications with problems in Engineering mostly in view.

238. *Analytical Geometry*:—I. R. Pounder.

All Departments, I Year; 1 hour per week, first term, 2 hours per week, second term.

The course in Elementary Analytical Geometry covers the more familiar propositions in connection with the straight line, circle, parabola, ellipse and hyperbola. The subject is treated so as to illustrate the general methods of analytical geometry.

239. *Trigonometry, Spherical*:—L. B. Stewart.

Department 1, II Year; 1 hour per week, first term.

A course of lectures includes the derivation of formulæ and their application to the solution of triangles and to practical problems.

Text Book:—*Spherical Trigonometry*—Todhunter and Leatham.

240. *Least Squares, Method of*:—L. B. Stewart.

Department 1, III Year; 1 hour per week, second term.

The course of lectures includes: The general principles of probability, the law of error, direct measurements of equal and different weights; mean square and probable errors; indirect measurements; conditioned observations; applications to empirical constants and formulæ, etc.

Text book:—*Least Squares*—Merriman.

## METALLURGY

241. *Elementary Metallurgy*:—G. A. Guess.

Departments 1, 2, 3, 6 and 8, II Year; 1 hour per week, second term.  
 A course of about 12 lectures on early furnace metallurgy and present practice, with special reference to iron and steel.

242. *Fuels and Combustion*:—G. A. Guess.

Department 8, II Year; 1 hour per week, both terms.

A lecture course dealing with fuels, their use, preparation, calorific values and temperature of combustion.

243. *Metallurgy*:—G. A. Guess.

Departments 2, 6, III Year; 1 hour per week, both terms.

Fuels, temperature of combustion, specific heat, conductivity and problems thereon; chimneys, furnaces, refractories, outline of furnace metallurgy and hydro-metallurgy.

244. *Physical Metallurgy*:—O. W. Ellis.

Departments 2, 3, 6 and 7, III Year; 2 hours per week, second term.  
The physical properties and structure of iron and steel and the more common alloys.

245. *Metallurgy*:—G. A. Guess, J. E. Toomer.

Department 8, III Year; 2 hours per week, first term; 1 hour per week, second term.

A lecture course on General Metallurgy accompanied by 3 hours laboratory per week, first term, and 6 hours per week second term.

246. *Physical Metallurgy*:—O. W. Ellis.

Department 8, III Year; 1 hour per week, both terms.

Changes of phase and of state, pyrometry, preparation of alloys, miscibility of metals, binary, ternary and complex alloys, the use of the microscope, with 3 hours laboratory per week, first term.

247. *Metallurgy*:—G. A. Guess, J. E. Toomer.

Departments 2 and 6, IV Year; 1 hour lecture per week, both terms; 6 hours laboratory per week, second term.

General metallurgy and metallurgical problems.

248. *Metallurgy Problems*:—G. A. Guess, J. E. Toomer.

Department 8, IV Year; 2 hours lecture and 4 hours laboratory, both terms.

Metallurgical book-keeping, balance sheets, thermal balance sheets, methods and processes.

249. *Metallurgy*:—G. A. Guess.

Department 8, IV Year; 1 hour per week, both terms.

Critical reading and discussion of papers and articles, describing metallurgical processes or dealing with plant arrangement and construction. Metallurgical flow sheets of typical plants.

250. *Physical Metallurgy*:—O. W. Ellis.

Department 8, IV Year; 1 hour lecture and 4 hours laboratory per week, both terms.

251. *Metallography*:—O. W. Ellis.

Department 2, IV Year.

A laboratory course of 3 hours per week, second term.

252. *Physical Metallurgy*:—O. W. Ellis.

Department 1, IV Year; 1 hour per week both terms.

The physical properties of metals and alloys used in Civil Engineering practice—specifications.

## MINERALOGY

- 255. Elementary Mineralogy:**—J. E. Thomson.

Department 2, I Year; 2 hours per week, first term.

After introducing the student to the chief chemical, physical, and crystallographic characteristics of minerals, the course becomes descriptive and deals with about one hundred of the minerals most important from the industrial or scientific point of view.

Text Book:—Study of Minerals—Rogers.

- 256. Mineralogy:**—J. E. Thomson.

Department 6 and 8, I Year; 3 hours per week, one term.

Introduction to determination of minerals by inspection and physical tests.

Text Book:—Mineral Tables—Eakle.

- 257. Primary Mineralogy:**—A. L. Parsons.

Department 1, II Year; 2 hours per week, first term.

A very brief introduction to the study of minerals and rocks.

Text books:—Study of Minerals—Rogers; Hand-Book of Rocks—Kemp.

- 258. Mineralogy:**—J. E. Thomson.

Department 2, I Year; 1 hour per week, first term; 3 hours per week, second term.

Determination of minerals by inspection and by means of physical tests; introduction to blow-pipe practice.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

- 259. Mineralogy:**—A. L. Parsons, J. E. Thomson.

Department 1, II Year; 1 hour per week, first term; 2 hours per week, second term.

Determination of minerals by inspection and by means of physical tests; study of common rock types and their identification.

Text books:—Mineral Tables—Eakle; Handbook of Rocks—Kemp.

- 260. Elementary Petrography:**—T. L. Walker.

Department 2, II Year; 1 hour per week.

A course of lectures and laboratory work introducing the student to the macroscopic study of rocks.

Text-books:—Handbook of Rocks—Kemp.

- 261. Mineralogy:**—J. E. Thomson.

Department 2, II Year; 2 hours per week.

Determination of minerals by means of the blow-pipe and physical properties.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

262. *General Petrography*:—A. L. Parsons.

Department 2, III Year; 1 hour per week.

Study of the chief rock-forming minerals and of some phases of petrography not covered in the course of the previous year.

Text Books:—Minerals in Rock-Sections—Luquer; Petrology for Students—Harker.

263. *Petrography*:—T. L. Walker.

Department 2, III Year; 2 hours per week, both terms.

Study of the chief rock-forming minerals, of rocks in thin sections and in hand specimens.

Text books:—Rocks and Rock Minerals—Pirsson; Minerals in Rock Sections—Luquer.

## MODERN LANGUAGES

266. *French*:—J. H. Cameron, Miss J. C. Laing, L. A. Bibet.

Required in Department 4, First Year; 2 hours per week, both terms; II and III Years, 1 hour per week, both terms.

*First Year*

- (a) Practice in translation of a selected text bearing on some phase of architectural study (for example, History of Art, History of France, extracts from great French writers), this text being used as a basis for discussion on various aspects of the student's work.
- (b) A course in Conversation to encourage the student to acquire a speaking knowledge of the language.

*Second Year*

- (a) A reading course intended to introduce the student to the best literature on architectural subjects; prescribed text: *Guadet: Éléments et théorie de l'architecture*, to which may be added other reading selected from time to time.
- (b) Conversation course continued from I Year.

*Third Year*

A continuation and development of the work of the II Year.

267. *German*:—G. H. Needler, B. Fairley.

Required in Department 6, all years; 1 hour per week, both terms.

An elementary course intended to train the student in the translation of scientific journals and treatises.

268. *Spanish*:—M. A. Buchanan.

Department 8, II Year; 1 hour per week, both terms.

An introduction to Spanish grammar, pronunciation and practice in reading Engineering Spanish.

## SURVEYING

**270. Surveying:**—S. R. Crerar.

Departments 1, 2, 3, 7 and 8, I Year; 1 hour per week, both terms. The lecture course includes the general principles; surveying with the chain, the compass and chain and the transit and chain, and level, the applications of trigonometry to inaccessible heights and distances; mensuration of surfaces, co-ordinate surveying, division of land, etc.

Text books:—Plane Surveying—Tracy; Theory and Practice of Surveying—Johnston and Smith; Elementary Surveying—Breed and Hosmer.

**271. Field Work:**—S. R. Crerar, J. W. Melson.

Departments 1, 2, 3, 7 and 8, I Year; 5 hours per week, first term. This course comprises testing chains; practice in chaining; a complete survey of a piece of land with the chain and transit; keeping of field notes; the use of the transit and compass in surveying closed figures and traverse lines and in ranging straight lines; plotting by latitudes and departures, and otherwise computing areas. Instrumental work with level.

**272. Surveying:**—W. M. Treadgold, E. W. Banting.

Departments 1 and 2, II Year; 1 hour per week, both terms.

This course of lectures takes up in detail, simple, reverse and compound curves as applied to railroad surveying. It also includes stadia, plane table and photographic surveying as applied to topographic work, and the main features of mine and hydrographic surveying.

Text books:—Henck, Searles, Allen (Field books for Engineers) Theory and Practice of Surveying—Johnston and Smith; Surveying—Breed and Hosmer.

**273. Field Work:**—W. M. Treadgold, E. W. Banting.

Department 1, II Year; 9 hours per week, first term.

Department 2, II Year; 6 hours per week, first term.

This course of instruction embraces all adjustments of the transit and level, minor problems in triangulation and traversing—levelling and plane table practice.

**274. Surveying and Levelling:**—W. M. Treadgold.

Department 1, III Year; 1 hour per week, both terms.

This course of lectures takes up the work of the railroad engineer on construction, including profiles, cross sectioning, computation of volume of earthwork, haul, transition curves, laying out turnouts, frogs and switches, etc.

Also a discussion of trigonometric and barometric levelling.

Text books:—Field Engineering—Searles; Railroad Curves and Earthworks—Allen.

- 275. Survey Camp:**—W. M. Treadgold, S. R. Crerar, E. W. Banting, J. W. Melson.

Departments 1 and 2, III Year.

This course includes:

- (a) Secondary Triangulation and Base Line Measurements.
- (b) Stadia, Plane Table and Boundary Traverses.
- (c) Highway and Railway Location.
- (d) Cross Sectioning and Computation of Earthwork.
- (e) Stream Gauging and Discharge Measurements.
- (f) Hydrographic Surveying.
- (g) Photographic and Micrometer work.
- (h) Stadia and Plane Table Topography.
- (i) Observations for Time, Azimuth and Latitude. This work is taken at Gull Lake Camp. See page 22.

- 276. Railroad Location and Design:**—W. M. Treadgold.

Department 1, Option "e," IV Year; 1 hour lecture per week, both terms; about 8 hours per week, both terms, in the drafting room.

This work will consist of an original survey for a railroad some one or two miles in length, the work to be carried out according to the most modern methods of location. Upon the completion of the field work, the complete survey will be plotted and a line adjusted to it. This will be staked out, profiles taken and the computation made of the earthwork and the preparation of overhaul diagram compiled for determination of haul and borrow. In the second term the design of track work, yards and practical problems will be taken up and special problems assigned.

#### ADDITIONAL FOURTH YEAR COURSES

- 280. Sanitary Engineering:**—Peter Gillespie.

Department 1<sub>b</sub>, IV Year; 1 hour lecture per week, both terms; 3 hours laboratory, first term; and 6 hours, second term.

Consideration is given to the problems of water supply and sewerage disposal as viewed by the engineer. Some practice in the design of works from assumed data is afforded.

Reference Books:—Public Water Supplies—Turneaure and Russell; American Sewerage Practice—Metcalf and Eddy, 3 vols.

- 281. Highway Engineering:**—A. T. Laing.

Department 1<sub>b</sub>, IV Year; 1 hour lecture and 3 hours laboratory per week, both terms.

This course of instruction deals with the design, construction and maintenance of public highways and street pavements, also with the properties of the materials employed. Accompanying the course of lectures is a laboratory course dealing with the various bituminous and non-bituminous materials of construction.

282. *Municipal Seminar*:—P. Gillespie, A. T. Laing.

Department 1b, IV Year; 3 hours per week, both terms.

This time is devoted to reading, essay writing and discussion of problems relating to highways, town planning, sanitation and kindred subjects.

## THESIS

285. *Thesis*.

Required in all Departments, IV Year, with the exception of Department 4, Architectural Design Option.

Each student is required to prepare a thesis of between six thousand and seven thousand words on a subject approved by Council. See circular of information.

## OUTLINE OF VACATION WORK

286. *Construction Notes*.

II Year. See special circular of information.

The construction notes required consist of neat and complete dimensioned sketches in pencil of any structures, machines or plants which may be of interest. Any object chosen should be represented and dimensioned in such a manner that it could be completely constructed from the notes as the only available information. (See page 20).

From students in Department 2, who have been actually engaged during the summer with Government or other approved geological survey parties, geological field notes will be accepted in lieu of construction notes.

## MASTER OF APPLIED SCIENCE DEGREE

1. A candidate for the degree of Master of Applied Science (M.A.Sc.) shall hold the degree of Bachelor of Applied Science (B.A.Sc.) of this University, or a degree recognized as equivalent, granted by another University.
2. He shall spend not less than one academic year in attendance as a student, in the Faculty of Applied Science, on a course of study approved by the Council.
3. He shall present a satisfactory thesis on a subject approved by the Council.
4. He shall pass such examinations as the Council may decide.
5. He must register at the beginning of the academic year.

## DEGREE OF MASTER OF ARCHITECTURE

1. A candidate for the degree of Master of Architecture (M.Arch.) shall hold the degree of Bachelor of Architecture (B.Arch.) or the degree of Bachelor of Applied Science in Architecture (B.A.Sc.) of this University or a degree recognized as equivalent, granted by another university.

2. He shall spend not less than one academic year in attendance as a student, in the Faculty of Applied Science, on a course of study approved by the Council.
3. He shall present a satisfactory thesis on a subject approved by the Council.
4. He shall pass such examinations as the Council may decide.
5. He must register at the beginning of the academic year.

### PROFESSIONAL DEGREES

The attention of graduates is directed to the following regulations respecting professional degrees.

The following degrees have been established: Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem.E.), subject to the following regulations:

1. A candidate for one of the said degrees shall hold the diploma of the School of Practical Science or of the Faculty of Applied Science and Engineering or the degree of Bachelor of Applied Science.
2. He shall have spent at least three years after receiving the diploma or the degree in the actual practice of the branch of engineering wherein he is a candidate for a degree.
3. Intervals of non-employment or of employment in other branches of engineering shall not be included in the above three years. It shall not be necessary that the several periods requisite to make up the said three years be consecutive.
4. Satisfactory evidence shall be submitted to the University examiners as to the nature and length of the candidate's professional experience for the purpose of clauses 2 and 3.

The Examiners shall satisfy themselves by oral or written examinations in regard to the candidate's experience and competence.

5. The candidate shall prepare an original thesis on some engineering subject in the branch in which he wishes a degree, the said thesis to be accompanied by all necessary descriptions, details, drawings, bills of quantities, specifications and estimates.

The candidates may be required at the option of the Examiners to undergo an examination in the subject of this thesis.

6. Notice in writing shall be sent to the Secretary not later than the first day of February, informing him of the degree to which the candidate wishes to proceed and of the title of his proposed thesis for the approval of the Examiners.
7. The evidence under clause 4, and the thesis, with accompanying papers, described in clause 5, shall be sent to the Secretary not later than the first day of April.

8. The candidate shall be required to present himself for examination in the month of April at such time as may be arranged by the Examiners.
9. The fee for any one of the said degrees shall be twenty dollars, and shall be paid to the Bursar not later than the first day of April.
10. The thesis, drawings, and other papers submitted under clause 7 shall become the property of the University.
11. Nothing in this statute shall prevent any candidate from receiving more than one of the said degrees, provided he has the necessary qualifications for each degree. An interval of three years must elapse between the granting of any two degrees under this statute.

#### CERTIFICATE FOR HIGH SCHOOL ASSISTANT

The Calendar of the Ontario College of Education provides for the admission of the holder of a degree in Science to the Course for a High School Assistant's certificate. The regulation requires that the applicant shall submit with his application:

"His certificate of graduation as Bachelor or Master of Arts, Bachelor or Master of Science, Bachelor of Commerce, Bachelor of Agriculture, or Bachelor of Applied Science, from a British University, after the regular university course approved by the Minister of Education as to entrance requirements and as to content of the undergraduate courses. Each applicant must have Upper School or Honour Matriculation standing in English and History and Mathematics or the equivalent of such standing."

## LABORATORY EQUIPMENT

---

### THERMODYNAMIC AND MECHANICAL LABORATORY

The University in 1919 completed the erection of a large, well-equipped building for the accommodation of the steam, gas, mechanical and hydraulic laboratories. A more complete description of the laboratories has been published elsewhere, so that the present description is only intended to give the main features.

The part of the building set apart for thermodynamics and other mechanical work is the ground floor of a room 60 ft. x 155 ft. This room is lighted entirely from the roof in a very perfect way. A part of the space 40 ft. wide running the entire length of 155 feet is served by a 3 ton travelling crane and contains the following equipment:

50 h.p. Brown engine with separate jackets on both heads and barrel of cylinder.

Two-stage Rand air compressor having compound steam cylinders, each fitted with Meyer cut-off gear. The low pressure air cylinder has Corliss inlet gear.

30 h.p. high-speed Leonard tandem compound engine with shaft governor.

15 h.p. high-speed McEwan engine.

75 h.p. two-line compound Willans engine.

15 h.p. DeLaval turbine with special nozzles for condensing and non-condensing tests.

Two 15 h.p. Leonard engines with different types of valves, which are used for valve setting.

There are also two surface condensers with air pumps so arranged that any engine in the laboratory may be made to exhaust into the atmosphere through an open heater or into one of the condensers, the change from one arrangement to the other being accomplished in a few minutes without the aid of valves.

The laboratory further contains:

A 3 ton York refrigerating machine with tanks.

An Amsler transmission dynamometer.

Apparatus for testing injectors and steam pumps.

Numerous other pieces of apparatus and instruments.

The work on internal combustion engines and producers is performed on the following:

18 h.p. Canada suction gas producer.

14 h.p. National gas engine arranged for various compressions and points of ignition.

10 h.p. Fielding and Platt engine for city gas or coal oil, having various adjustments.

8 h.p. Otto gas engine.

6 h.p. marine gasoline engine.

Various accessories to above machines.

Steam for the laboratory is supplied by two 50 h.p. and one 100 h.p. Babcock and Wilcox boilers, the latter having an internal superheater. These boilers are located in a separate boiler room. They are used for experimental work only and are fitted up for testing. The gases pass up through two independent chimneys, and these have been arranged so that the draft and other conditions in the chimney at any point of its height may be examined.

In smaller work-rooms off the main laboratory are placed belt and oil testing machines, apparatus for testing the efficiency of gears and machines, and for experiments in the balancing of machinery.

### HYDRAULIC LABORATORY

The hydraulic laboratory occupies two floors each 40 feet x 112 feet, which are well lighted by large windows on the side and end.

The water for the experimental work is pumped through the various pieces of apparatus from a well by means of two turbine pumping units, both of which are driven by a Belliss and Morcom compound engine of 125 h.p. running at a speed of 525 revs. per minute. Both engine and pumps have been installed with a view to using them in experimental work as well as for supply of water for other apparatus used in the laboratory.

The pumping units are capable of delivering one cubic foot of water per second against heads of 250 feet and 300 feet respectively. These units are designed and connected up so that they may be run in series giving the above discharge at 550 feet head, or they may be run in parallel giving double the discharge at a lower head. Each pumping unit consists of two two-stage pumps mounted on a common base and driven by a single pulley, and the construction and piping are such that each two-stage pump may be driven separately or that all may be driven at once, discharging separately one cubic foot per second at about 125 feet head through each of four independent pipes, or else the pumps may be run in series or in parallel. The scheme is thus well adapted to laboratory work, and under the heads used on reaction turbines about six cubic feet per second may be obtained.

The laboratory further contains a large vertical steel tank  $5\frac{1}{2}$  feet diameter by 34 feet with arrangements for the attachment of nozzles and other mouthpieces, etc. Connections are also arranged for reaction turbines, the tank acting as a reservoir.

The discharge from the turbines or nozzles is measured in a weir tank nearly 6 feet wide and 21 feet long, containing a contracted weir  $4\frac{1}{2}$  feet

wide. This weir may be calibrated by two weighing tanks, each having a capacity of about 240 cubic feet.

There are three reaction turbines and two impulse wheels all ready for experiment, the power being measured by brakes and the water by weir or orifices. Amongst the reaction turbines may be mentioned the one designed and built by Escher Wyss & Co., specially for the laboratory.

Smaller orifice and weir tanks, each about 3 x 3 x 12 feet with necessary measuring tanks, are arranged for instruction in coefficients of various kinds and practice with weirs and orifices.

A Venturi meter and other meters, also an hydraulic ram and similar devices are available for testing, and good facilities have been arranged for investigating friction and other properties of pipes and fire hose.

For special investigations on turbine and centrifugal pumps, other pumps in addition to those already described have been arranged.

The basement of the laboratory contains an open trough 5 feet wide, about 110 feet long, with a large weir at one end. It is intended to use this trough for experiments on the flow in open channels, for measurements of large discharges by means of the weir, and for experiments with current meters and Pitot tubes.

Numerous pieces of smaller apparatus, together with all instruments required, have also been provided, and the laboratory equipment is believed to be very complete.

### AERONAUTIC EQUIPMENT

For the purpose of the scientific study of problems connected with aviation and the best design of aeroplanes, and also of all problems connected with the effect of wind pressure, a standard 4ft. N.P.L. type wind channel has been installed in the Hydraulic Laboratory and equipped with the latest form of balance and all necessary instruments.

There are available for laboratory demonstration and instruction purposes the following aeroplanes:—one S.E. 5A, one Avro Training and two J.N. 4 Curtis Training, all the gift of the Royal Air Force.

The laboratory also contains a number of aeroplane engines of various types, both rotary and stationary, and a number of models. These machines are available for inspection, and are of much help in studying the trend of development and design in the power plant of lightest weight.

### DONATIONS TO THE THERMODYNAMIC AND HYDRAULIC LABORATORIES

The following donations to the equipment of the laboratories have been made through the kindness of those mentioned:

50 h.p. Wheeler Surface Condenser, presented by Mr. F. M. Wheeler, New York.

Blake Feed Pump, presented by the manufacturers.

6-inch New American Turbine, presented by Wm. Kennedy & Sons, Owen Sound, Ont.

Two Crown Water Meters, presented by the National Meter Co., New York, through Mr. M. Warnock, Toronto.

Rock Drill, presented by Sullivan Machinery Co., New York, through Mr. A. E. Blackwood, '95.

Marine Gasoline Engine, presented by Canadian Fairbanks Co., Montreal.

Two engines with different types of valve, presented by Messrs. E. Leonard & Sons, London, Ont.

Bundy trap from American Radiator Co., through Messrs. Russell & Gifford.

Dunham steam trap from C. A. Dunham Co.

Sectional models of valves from American Radiator Co.

Sectional model Mason Reducing Valve by Russell & Gifford.

Tanks, etc., by John Inglis Co.

Pressure Fan from Sheldons Ltd., Galt.

Model water turbine test runner from Wellman, Seaver Morgan Co., Cleveland, O.

In addition to the above, other firms have materially assisted by offering apparatus at or below cost price, among whom may be specially mentioned, The Canadian Rand Drill Co., Sherbrooke, Quebec.

The following machines are gifts from the Royal Air Force:

Liberty Aeroplane Motor 400 h.p.

200 B. h.p. Siddeley Deasey Aero Engine.

120 h.p. Beardmore Aero Engine.

Curtis Engine (Sectional).

Hispano Suiza Aero Engine.

80 h.p. Le Rhone Rotary Engine.

Clerget Rotary Engine.

Gnome Monosoupape Engine.

Admiralty Rotary Engine 150 h.p.

Models of Engines, etc., and numerous spare parts.

#### ENGINEERING PHYSICS LABORATORIES

The Optical Laboratories are equipped with 3 metre benches for class instruction in the fundamental theory of optical instruments. There is also an equipment consisting of one or more of the following: field glasses, telescopes, microscopes, spectrometers, comparators, focometer, sextant, polarizing devices, etc. Precision photometric equipment for both gas and electric light photometry is provided.

The Hydrostatic Laboratory is supplied with various types of hydrometers, hydrostatic balances, pumps, gauges, etc.

The Heat Laboratory is equipped with a full supply of calorimeters and accessories for determination of latent and specific heat, expansion apparatus, air thermometer, apparatus for verification of Boyle's law and pressure and boiling curve, and for determination of the absolute expansion of mercury, Callendar's apparatus for determination of the mechanical equivalent of heat. Calorimeter for the determination of the value of solid, liquid and gaseous fuels.

The Acoustical Laboratory is provided with sonometer, siren, forks ordinary and electric, Lissajous' and Melde's apparatus, organ pipes of various forms, manometric flame apparatus and a special equipment for work in architectural acoustics consisting of torsion chronograph, electro-pneumatic wind chest and standardized organ pipes and other accessories.

### PHOTOGRAPHIC AND PROJECTION LABORATORIES

The Photographic Laboratory contains a supply of small cameras for the use of students, enlarging cameras, printers, blue printing machine and the necessary dark rooms.

This Department also carries on a photographic and projection service for all Faculties and Departments of the University. The equipment for this work consists of cameras for making photographs up to full plate size, enlargers, photo-micrographic apparatus, motion picture cameras for both gross and micro work, with the necessary developing and printing machines, a rotary blue print machine, a photostat, etc.

For projection service there is a motion picture projector and a number of projection lanterns for service in any University Building.

### ELECTRICAL LABORATORIES

The Department of Electrical Engineering is located in the new Electrical Building. The accommodation includes quarters for staff, library, lecture rooms, laboratories, stores, and shop for repairs and construction.

Services.—Three-wire direct-current, 110 kw., from the University power house, automatically regulated at our end for constant voltage of desired value at our main switchboard. Three-phase, 60 cycles, 60 k.v.a., 115 volts, automatically regulated as to voltage and frequency. Three-phase, 25 cycles, 30 k.v.a., automatically regulated as to voltage and frequency. Every laboratory has all three services available at convenient places. There are three main boards, one for each floor. A system of special trunk lines between boards, and tree systems on each floor, enable easy arrangement of any desired special connections from any laboratory to any other.

Alternating current laboratory.—Area 26 x 110 ft., Service sets, 60 and 25 cycles, Tirrill regulators. Two 60-cycle and two 25-cycle, 15 k.v.a. motor-generator sets; converters; various motors, squirrel cage and wound rotor induction types, repulsion and other single-phase types, unity power factor motor, polyphase motor with variable speed shunt characteristics and speed range of 4 to 1; transformers, single and three-phase; constant-current transformers with load of series arc lamps; lamp racks, reactors, condensers, brakes, etc.; oscillographs; indicating, graphic, recording, and demand meters of the best makes; all arranged to facilitate a very general line of experimental work.

Direct current laboratory.—40 kw. 230 to 115 volt motor generator set with Tirrill regulator for special tests. Numerous 5 kw. to 10 kw. motor-generator sets; shunt, series, compound motors; special interpole machines; loading racks, dynamometers, rheostats, numerous meters of first quality, etc., for any sort of study.

Measurements Laboratory.—26 x 110 ft. Fitted with very flexible storage battery service which can be connected to any desired working place; d.c. three-wire service, also 60 and 25-cycle three-phase everywhere; galvanometers, resistance boxes, bridges, shunts, potentiometers, standard cells, bond testers, ductor, megger, apparatus for measuring low resistances, artificial lines for fault measurements, condensers, inductances, rails, cables, voltmeters, ammeters, wattmeters, dynamometers, etc., for general work on a great variety of measurements.

High voltage laboratory.—For various lines of study with voltages up to 200,000 volts. Flexible and safe provision for control.

Materials laboratories.—One specially fitted for general work on conducting materials, one for magnetic materials, one for dielectric materials.

Radio laboratory.—Adapted for the measurement of various quantities of interest in this work, including the strength of incoming signals. One single conductor aerial 1,200 ft. long, one multi-conductor aerial 120 ft. long.

Standardizing laboratories.—One students' calibration room for direct-current meters, another for alternating-current meters. A standards room, constant temperature, for master standards of voltage, resistance, current, power, etc.

Research laboratories.—Four rooms set apart for this work, in combination with facilities of the other laboratories.

Design laboratory—Arranged for calculation work on apparatus selected to illustrate essential principles.

## CHEMICAL LABORATORIES

The Chemical laboratories are situated in the western half of the Chemistry and Mining building, on the first and second floors. The rooms are large and well lighted, and are supplied with the usual modern equipment.

The first and second year laboratory for qualitative work has accom-

modation for 112 students, each working space being supplied with water, gas and fume cupboard. The laboratory for quantitative analysis will accommodate 48 students, and is supplied with commodious fume cupboards and all necessary apparatus. A laboratory with working places for 36 is provided for the students engaged in the study of technical chemistry; it is equipped with appliances for the preparation and testing of chemical products. A laboratory for fourth year students with accommodation for eight workers has been fitted up. Each of these laboratories has its own balance room adjoining furnished with instruments from the best makers and adapted to the particular objects in view.

In addition there are rooms set apart for gas analysis, electrolytic analysis and a specially constructed fireproof laboratory for combustion, crucible and bomb furnaces. A calorimeter room has been equipped in the basement. Each of these laboratories is supplied with apparatus of the most approved design, providing excellent facilities for the prosecution of work in analytical and technical chemistry.

### ELECTROCHEMICAL LABORATORIES

The Electrochemical laboratories, which are situated in the Chemistry and Mining building, are provided with special facilities for electrolytic work, including a large storage battery and electroplating dynamo with tanks as well as a good set of apparatus and electrical measuring instruments. The experimental work on electric furnaces is performed in two rooms specially equipped for this purpose with rheostats and switchboard connections to a 120 kw. d.c. generator which supplies the current required.

### ASSAYING LABORATORIES

These are situated in the west end of the basement in the Mining Building. They consist of five rooms, in addition to a library for study and an instructor's room. The East laboratory, 17 x 47 feet, and the West laboratory, 28 x 37 feet, are equipped with coal, oil and gas furnaces of various design. Each room has a fume cupboard, and the necessary equipment for the wet work in connection with assaying. Accommodation for twenty-four students at a time is provided, by individual work desks, each supplied with a balance, weights, fluxes, tools, drawers and lockers. Common to both laboratories is the balance room which has a cement table on brick piers to support the bead balances. These are illustrative of the types met in practice. Adjoining the West laboratory is a research room. A store-room adjoins the East laboratory where fluxes, clay ware and extra parts are kept. In the instructor's room are stored a large number of ores and bullion, obtained chiefly from typical mining districts and metallurgical plants, for class use. The preparation of ores is done in the Milling building, where crushers, pulverizers and sampling devices are available. A special laboratory sampler has been constructed for the purpose of giving samples for the student's assays, of indisputable similar-

ity, thus confining variations in results to the students' work. Other apparatus includes Guess-Haultain stationary electrolytic outfits, King rotating electrolytic apparatus, microscopes, optical resistances and thermocouple pyrometers, hand and foot cupel machines, grinding plates and screens.

### MINING AND ORE DRESSING LABORATORY

A detached building 72 ft. x 70 ft. contains the Mining and Ore dressing equipment. It is heated, lighted and supplied with power from the central plant. It is divided into several parts, the larger being 72 ft x 53 ft. by 22 ft. high.

In this room is a 5-stamp battery with amalgamation plates, Wilfley table, Deister Plat-o table, Deister slime table, buddle, and classifiers of sufficient size to make tests on lots of from one to ten tons.

In addition are a set of small Wilfley tables, two 3-compartment jigs, a 2 ft. x 3 ft. tube mill, a small experimental tube mill, agitators, small classifiers and other testing apparatus for experimenting on the falling rates of ore particles, slime settling, surface tension and flotation processes. These include a Case machine, a K. and K. machine, a Ruth machine, a Callow cell, etc. Water is supplied from a tank in the roof. The machinery is all motor driven.

One portion of the room is devoted to rock drills of various types and other mining apparatus.

The other part of the building, 72 ft. x 17 ft., is divided into several rooms and contains a Hadfield's Gyratory Crusher, 16 in. x 12 in. Rolls, small crushers, screening machine, and sampling apparatus. The crushers are driven by a 30 h.p. motor in another room.

The other rooms contain a Wetherill magnetic separator, screen sets, a smithing equipment, workshop and storage for small lots of ore. The larger part of the ore supply is accommodated in bins outside the building.

The plant throughout is intended mainly for teaching and experimental purposes.

### METALLURGICAL LABORATORY

This laboratory, in the East end of the Mining building, occupies about 3,600 sq. ft. on the basement floor and the same space immediately above on the ground floor. A stairway connects the two floors. The basement floor is divided into one large furnace room, a small hydrometallurgical room and two store-rooms. The furnace room contains a motor driven Connersville blower, several gas fired furnaces, two small blast furnaces, and a small 6 hearth Wedge roasting furnace. The larger electric furnaces of the Department of Electrochemistry are in this room. Some are supplied with direct current, others with A.C. from a 300 K.W. transformer. A system of flues, with hoods over all the furnaces, leads through

a Cottrell precipitator of the Rathbun type taking current at 50,000 volts, to a stack through which gases are pulled by a fan in the attic.

The hydro-metallurgical room in addition to apparatus for leaching tests contains several natural draft furnaces, a large Hoskins resistance furnace. There are also tanks for electrolytic refining and precipitation of metals.

The upper floor is divided into laboratories, store rooms and offices. The laboratories are: 1. Metallurgical analysis; 2. Heating treatment and pyrometry; 3. Grinding, polishing and etching; 4. Metallographic room with an adjoining dark room.

In the laboratory for metallurgical analysis the student is given some training in mill and smelter methods of analysis. It is well equipped for this work.

In the heat treatment and pyrometry laboratory are a number of tube furnaces of different sizes, a Leeds & Northrup transformation point indicator with furnace, double thermocouple and twin galvanometer, a Leeds & Northrup potentiometer pyrometer, a disappearing filament pyrometer, and many thermocouples for use with galvanometer or potentiometer. For grinding and polishing there is provided two motor driven emery wheels and a set of 3 motor driven horizontal polishing plates.

The metallographic room is equipped with one horizontal photo micrographic instrument made by Pellin Paris, one vertical photo micrographic apparatus by Bausch & Lomb and two other Bausch & Lomb metallographic microscopes.

There is also a Pellin instrument for the determination of critical points by photography according to the Saladin method.

### MECHANICS OF MATERIALS LABORATORY

This laboratory is intended for the scientific and commercial testing of materials of construction such as iron, steel, timber, concrete and masonry.

It is supplied with the following:

An Emery 50-ton hydraulic machine, built by Wm. Sellers & Co., of Philadelphia, for making tests in tension and compression.

A 100-ton screw power machine, built by Riehle Bros., Philadelphia. It is designed for making tests in tension, compression, shearing and cross-breaking, and will take in posts 12 feet long and beams up to 18 feet in length.

A Riehle 10-ton screw power universal testing machine.

A Riehle 50-ton screw power universal testing machine.

A 15-ton single lever-machine, built by J. Buckton & Co., Leeds, England.

A torsion machine, built by Tinius Olsen & Co., Philadelphia, for testing the strength and elasticity of shafting. This machine will twist shafts up to 16 feet in length and 2 inches in diameter.

A hand power torsion machine of simple mechanical construction, specially designed for the testing of short shafts of a maximum diameter of one inch.

A Riehle transverse testing machine of 5,000 pounds capacity, adapted to specimens up to 48 inches in length.

A Riehle compressometer, with spherical seat attachment for the adjustment of specimens having slightly non-parallel faces. This compressometer will receive specimens up to 10 inches in length.

An Olsen compression micrometer of standard type.

A 20,000 pound Olsen, hand power, wire testing machine, specially fitted for testing wooden columns with both fixed and pivoted ends.

An Olsen combined impact tension and cantilever type testing machine.

An Olsen, 20,000 pound, hand power testing machine especially adapted for testing long columns.

An Olsen, 200 pound capacity, textile testing machine.

A Riehle abrasion cylinder, built to the standard required by the National Brickmaker's Association, adopted in 1901.

A Berry strain-gauge for spans of 3 inches and 8 inches.

A Nalder dividing engine. This may be used either for the precise division of scales or for the calibration of instruments intended for refined measurements.

A Brinell hardness testing machine.

A Shore scleroscope for testing hardness.

A large number of extensometers of the usual degree of precision. These include the Bauschinger, Martens, Unwin, Ames, Riehle, Johnson, Henning (recording) and other types. In addition there are the usual scales, micrometers, telescopes and reflectors, voltmeters for the determination of metallic contact, and such other appliances as are necessary in the making of precise measurements.

The shop is equipped with a number of high-class machine tools specially fitted for reducing the specimens to the requisite shapes and dimensions with a minimum of hand labour. It is also supplied with the necessary appliances for making ordinary repairs and for making apparatus for special experiment and original investigation.

## HIGHWAY LABORATORY

### ROAD METALS

This laboratory is equipped for carrying out investigations in the various materials employed in highway construction and maintenance, and comprises the following:

Page impact machine for testing the toughness of road materials.

Diamond core drill for preparing specimens for the toughness test.

Deval abrasion machine for testing the resistance to wear of road materials.

Cementation testing apparatus (Page type) for determining cementing properties of road materials.

Jaw crusher (Mitchell type) for crushing rock for various tests.

Power driven agitator with sieves for the mechanical analysis of sand, gravel and crushed rock.

Dorry hardness testing machine for determining the hardness of rock used in road construction.

#### BITUMENS

This laboratory is designed for the investigation of the physical rather than the chemical properties of bitumens used in road construction and maintenance. The equipment consists of an extractor for separating bitumens and aggregates, an Engler viscosimeter, a penetration apparatus as well as appliances for determining melting point, volatilization, specific gravity, ductility, etc.

#### LABORATORY OF ONTARIO BOARD OF HEALTH

Through the courtesy of the Secretary of the Provincial Board of Health for Ontario the facilities of the excellently equipped laboratory which the Board maintains at Stanley Park have, with certain conditions, been placed at the service of the University for the investigation of problems of interest to the sanitarian and the sanitary engineer. The equipment consists of various types of sewage sedimentation tank, sewage filter, sewage measuring devices, aerators, sterilizing appliances and a complete and representative plant intended for the filtration and sterilization of water by practically all known methods.

#### CEMENT TESTING LABORATORY

This laboratory is fitted with all the ordinary moulds, sieves, balances burettes, steaming and drying tanks, tables, and other appliances necessary in making the usual physical tests of a Portland cement. It is also supplied with completely equipped cabinets for individual work. In addition there are the following:

A 2,000 lb. Riehle shot machine for tension.

A 2,000 lb. Fairbanks shot machine for tension.

A 1,000 lb. Olsen automatic shot machine fitted for tests in either tension or cross breaking.

An Olsen soapstone moist closet of modern design.

#### METROLOGICAL LABORATORY

The department of surveying and geodesy is provided with all the ordinary field instruments, such as transits, levels, compasses, micrometers, sextants, planimeters, plane tables, tapes, chains, etc., with which is carried on the instruction in practical field operations as detailed elsewhere.

A small laboratory is also established in the basement of the observatory described below, containing the necessary instruments for the refined measurements of geodetic surveying; as, a standard yard and metre, a Rogers 10-foot comparator, an invar base measuring apparatus, a Kater's pendulum with vacuum chamber, a level trier, micrometer microscopes, etc.

The geodetic observatory in connection with this department is used for the instruction of students of the Fourth Year in taking observations for time, latitude, longitude, and azimuth by the precise methods used in connection with a geodetic survey. It contains a 10-inch theodolite and zenith telescope by Troughton & Simms; an astronomical transit instrument and an 8-inch theodolite by Cooke; two electro-chronographs; a Howard astronomical clock; a Dent sidereal clock; a Dent sidereal break-circuit chronometer; a wireless receiving instrument; arithmometers, etc.

#### GEOLOGICAL AND MINERALOGICAL LABORATORIES

In the Chemistry and Mining building on College Street the University possesses a modern laboratory for Geology and Mineralogy.

Courses are given in laboratory work, especially in personal examination of type sets of rocks, fossils, minerals and crystal models. These laboratory exercises serve to illustrate the introductory didactic instruction.

For the encouragement of pure crystallography the laboratories are supplied with goniometers of the various types, crystal models, appliances for the cutting of oriented crystal sections and for the physical examination of the same. Practical petrography is carried on in rooms provided with type sets of rocks, both macroscopic and microscopic. Advanced students are taught to make thin sections of rocks and fossils and to study them microscopically. For students in Mining a laboratory course in the interpretation of geological maps and section is provided. Typical mining regions are studied in detail and an opportunity is afforded for the examination of specimens illustrating economic geology.

The laboratory for the preparation of thin sections of rocks, minerals and fossils is provided with electric diamond saws and grinding appliances for the various types of work incidental to the preparation of thin sections and museum material.

A room is also provided for advanced work in cartography and geological surveying.

The departments possess 28 petrological microscopes and 5 of other types, so that it is now possible to provide advanced students with instruments and sets of thin sections for their own especial use. The blowpipe laboratory contains 156 lockers, especially designed for apparatus for students.

## LIBRARY

The University Library is contained in a building of its own, situated on the east side of the campus, that lies to the south of the Main Building. All students who have paid a library fee to the Bursar of the University are entitled to the privileges of the Library. Besides Reading Rooms the Building contains Departmental Studies, which may be used as study-rooms by honour students in the various branches and in which the Professors hold seminary courses, and private studies, intended for members of the Faculty or advanced students engaged in research work. The Library is opened at 8.45 every morning and remains open until 5.15 in the afternoon (6 p.m. during the second term). Books in ordinary use may not be taken out of the building during the daytime, but are lent for the night shortly before the hour of closing, to be returned the following morning before 10 o'clock. Books not in general demand may, on special application, be borrowed for a longer period. Failure to return a borrowed book at the proper time and other breaches of the regulations are punishable by fine or suspension from the privileges of the Library.

Rooms have been set apart in the Engineering and the Chemistry and Mining and Electrical buildings for the housing of such periodicals and other literature of the University Library as is of special interest to the students of this faculty.

## ROYAL ONTARIO MUSEUM

### ARCHAEOLOGY, GEOLOGY, MINERALOGY, PALAEONTOLOGY, ZOOLOGY

Students of the University in all departments are recommended to avail themselves of the privileges of the Museum, which, although under separate control, is intimately connected with the work of the University.

The Museum is open on all week days from 10 a.m. to 5 p.m., and on Sundays from 2 p.m. to 5 p.m. The admission is free to the public on Tuesday, Thursday, Saturday and Sunday. On other days an admission fee of fifteen cents is charged.

By a resolution of the Board of Trustees all regular students of the University may be admitted free on all days of the week by presenting their card of registration.

## UNIVERSITY OF TORONTO C.O.T.C.

The Toronto Contingent of the Canadian Officers Training Corps was organized in 1914, with a strength of 12 Companies. Its primary object is to provide students at Universities with a standardized measure of military training with a view to their qualifying for commissions in the country's auxiliary forces. C.O.T.C. Certificates of qualification exempt their holders from examination for commissioned rank on joining a militia unit. The facilities which are offered by the contingent for obtaining a

qualification while at the University, are intended to enable gentlemen to give personal service to their country with the least possible interference with their civil careers, to ensure that units have their establishments complete in the junior commissioned ranks, and to build up an adequate reserve of scientifically trained officers who have completed a period of consecutive and systematic military training, on academic lines, of a nature calculated to produce good officers.

The contingent provides the practical work for students taking the Military Studies option for the B.A.Sc. degree, as also physical exercise for students who may choose this as the form in which they will take their compulsory Physical Training. In addition to service in the corps for a University credit, students of any year or Faculty are trained in it to qualify for the Militia Department's officers' certificates. As the corps develops, after the set-back subsequent to its continuous activities during the war, it is hoped that it may be possible to form companies according to faculties and to so arrange the training of each that on leaving the University students will be qualified for commissions in that branch of the Militia to which their University course particularly applied.

The C.O.T.C. is a unit of the non-permanent Active Militia but forms no part of the organization for war and cannot be called out for active service as such. It is a training centre for the educated youth of the country from whom, as from all its sons, the Empire requires hard service but the hardest from those to whom most has been given.

The present Headquarters are at 184 College Street, and include armouries, members' reading room, library, and lecture room.

The Contingent's Staff is:

*Officer Commanding*.....Colonel W. R. Lang, late Gen. Staff, C.E.F.  
*Second in Command*.....Major T. R. Loudon, late Can. Eng., C.E.F.  
*Adjutant*.....Major H. H. Madill, late C.E.F.  
*Quartermaster*.....Lieut. V. C. Kerrison, late C.A.S.C., C.E.F.  
*Paymaster*.....Lieut. T. A. Reed  
*Musketry Officer*.....  
*Contingent Sergeant-Major*...S.-M. W. Hunt, late Royal Welsh Fusiliers.

## SOCIETIES

### THE ENGINEERING SOCIETY OF THE UNIVERSITY OF TORONTO

#### OFFICERS FOR 1921-1922

<i>President</i> .....	J. A. Langford
<i>Vice-President</i> .....	H. M. Morris
<i>Treasurer</i> .....	H. J. Coulter
<i>Corresponding Secretary</i> .....	G. M. Crossgrove
<i>Recording Secretary</i> .....	R. G. Morrison
<i>Curator</i> .....	W. J. W. Reid
<i>Fourth Year President</i> .....	S. L. Coulter
<i>Third Year President</i> .....	J. Farley
<i>Second Year President</i> .....	J. M. Dymond
<i>First Year President</i> .....	H. L. Norman
<i>Civil Club Representative</i> .....	G. A. McClintonck
<i>Mining Club Representative</i> .....	J. Drybrough
<i>Electrical Club Representative</i> .....	W. C. C. Duncan
<i>Chemical Club Representative</i> .....	A. E. H. Fair
<i>Architectural Club Representative</i> .....	W. B. Helme

The Society meets every second Wednesday during the academic year (except April), beginning with the second Wednesday in October. Addresses are given by prominent men on subjects of general interest.

The Society is divided into six clubs for the purpose of affording a medium of study of matters relating in particular to different branches of Engineering. Each of the Clubs holds its meetings at regular intervals. Papers are read and discussions held on engineering subjects.

The Society publishes an annual, called "Transactions," which contains the addresses given at the meetings and an account of the year's activities.

A Supply Department is conducted by the Society on a co-operative plan, through which instruments, draughting supplies, stationery, etc., can be purchased at a low cost.

#### ATHLETIC ASSOCIATION

1921-1922

<i>President</i> .....	W. Beattie Ramsay
<i>Vice-President</i> .....	G. W. Smart
<i>Secretary-Treasurer</i> .....	R. C. Relyea
<i>Fourth Year Representative</i> .....	A. K. Greig
<i>Third Year Representative</i> .....	F. S. Seaborne
<i>Second Year Representative</i> .....	K. V. Heyland
<i>First Year Representative</i> .....	D. L. Polack

The Athletic Association has full control over all athletic clubs using the name of the Faculty of Applied Science. The Executive Committee has power to suspend any one from the privileges of membership in the Association for any breach of its regulations, and controls the finances of all athletic clubs in the aforesaid Faculty. The annual membership fee of this Association is one dollar.

No other moneys are collected for the support of athletics in the Faculty of Applied Science without the sanction of the Executive Committee.

### DEBATING CLUB

1921-1922

<i>Hon. Chairman</i> .....	Prof. C. R. Young
<i>Chairman</i> .....	D. W. Rosebrugh
<i>Secretary-Treasurer</i> .....	W. A. Osbourne
<i>Fourth Year Representative</i> .....	G. F. Bryant
<i>Third Year Representative</i> .....	J. A. Paget
<i>Second Year Representative</i> .....	W. A. Becker
<i>First Year Representative</i> .....	S. M. Jones
<i>I.C.D.U. Representative</i> .....	G. H. Rowat

### THE INDUSTRIAL CHEMICAL CLUB

OFFICERS FOR 1921-1922

<i>Hon. President</i> .....	Prof. J. W. Bain
<i>Hon. Vice-President</i> .....	Dr. M. C. Boswell
<i>Chairman</i> .....	A. E. H. Fair
<i>Vice-Chairman</i> .....	L. M. Price
<i>Fourth Year Representative</i> .....	H. M. Dingman
<i>Third Year Representative</i> .....	E. H. Carnahan
<i>Second Year Representative</i> .....	S. A. Rowland
<i>First Year Representative</i> .....	H. Trotter
<i>Secretary-Treasurer</i> .....	H. N. Baker
<i>Curator</i> .....	V. B. Lillie

The object of the Chemical Club is to promote the study of industrial chemistry and chemical engineering. Illustrated lectures, preceded by an informal dinner and a short musical programme, are held fortnightly, and on the following day an excursion is made to industrial concerns located in the city or vicinity.

**MECHANICAL AND ELECTRICAL ENGINEERING CLUB  
1921-1922**

<i>Hon. Chairman</i> .....	Prof. R. W. Angus
<i>Hon. Vice-Chairman</i> .....	Prof. H. W. Price
<i>Chairman</i> .....	W. C. C. Duncan
<i>Vice-Chairman and Fourth Year Representative</i> .....	W. L. Yack
<i>Secretary and Third Year Representative</i> .....	J. G. Ingles
<i>Treasurer and Second Year Representative</i> .....	G. M. Crossgrove
<i>Curator and First Year Representative</i> .....	W. R. Carruthers

The Club meets every Thursday during the academic year for the discussion of papers relating to mechanical and electrical engineering problems.

**CIVIL ENGINEERING CLUB  
1921-1922**

<i>Hon. Chairman</i> .....	Prof. C. R. Young
<i>Chairman</i> .....	G. A. McClintock
<i>Vice-Chairman</i> .....	K. W. Irwin
<i>Secretary-Treasurer</i> .....	F. B. Boswell
<i>Fourth Year Representative</i> .....	M. D. Stewart
<i>Third Year Representative</i> .....	A. A. Rose
<i>Second Year Representative</i> .....	A. R. Chadwick
<i>First Year Representative</i> .....	D. Wyatt

The Club is addressed during the academic year by practising engineers on modern methods and problems in civil engineering.

**MINING AND METALLURGICAL CLUB  
1921-1922**

<i>Hon. Chairman</i> .....	Prof. G. A. Guess
<i>Chairman</i> .....	J. Drybrush
<i>Vice-Chairman and Fourth Year Representative</i> .....	A. H. Stratford
<i>Secretary-Treasurer and Third Year Representative</i> .....	W. S. Maguire
<i>Second Year Representative</i> .....	J. C. Adamson
<i>First Year Representative</i> .....	H. G. G. Whitton
<i>Chairman Entertainment Committee</i> .....	F. J. Lyle

The Club is the official organization representing the undergraduates of Departments 2 and 8 of the Faculty of Applied Science.

The objects of the Club are to promote the spirit of good fellowship and mutual assistance amongst its members, both graduate and undergraduate, to provide a means of meeting together, and for the discussion of pertinent topics.

## ARCHITECTURAL CLUB

1921-1922

<i>Hon. Chairman</i> .....	Prof. Adrian Berrington
<i>Chairman</i> .....	J. B. Helme
<i>Vice-Chairman</i> .....	M. A. Norcross
<i>Secretary</i> .....	P. A. Deacon
<i>Treasurer</i> .....	J. G. Magee
<i>Third Year Representative</i> .....	F. B. Brown
<i>Second Year Representative</i> .....	E. M. Coleman
<i>First Year Representative</i> .....	W. H. Steele

## SKETCH CLUB

1921-1922

<i>Hon. President</i> .....	C. W. Jeffreys
<i>President</i> .....	J. L. VanCamp
<i>Vice-President</i> .....	J. G. Magee
<i>Secretary</i> .....	K. F. Noxon
<i>Treasurer</i> .....	G. R. Walton

## FACULTY OF APPLIED SCIENCE

## YOUNG MEN'S CHRISTIAN ASSOCIATION

The Y.M.C.A. of the Faculty of Applied Science was organized January 27th, 1905, and forms an integral part of the University of Toronto Y.M.C.A., which is a Federation of the Associations of the various Colleges and Faculties of the University. The object of the Association is to develop a true Christian manhood and to help the students in whatever way possible.

## OFFICERS FOR 1921-1922

<i>Honorary President</i> .....	Prof. R. W. Angus
<i>President</i> .....	T. S. Glover
<i>Vice-President</i> .....	J. H. MacIntosh
<i>Secretary-Treasurer</i> .....	L. C. Jackson

## UNIVERSITY OF TORONTO STUDENTS' ADMINISTRATIVE COUNCIL, 1921-1922

## REPRESENTATIVES FROM ENGINEERING SOCIETY

<i>President Engineering Society</i> .....	J. A. Langford
<i>Fourth Year Representative</i> .....	H. G. Thompson
<i>Third Year Representative</i> .....	F. A. Murphy
<i>Second Year Representative</i> .....	W. A. Osbourne
<i>First Year Representative</i> .....	H. L. Norman

## LODGING AND BOARD

Accommodation is readily obtainable in numerous private boarding-houses within convenient distance of the University, at a cost of from twelve dollars a week upwards for comfortable lodging with board; or rooms may be rented at a cost from six dollars a week upwards, and board obtained separately at about seven dollars per week. A list of accredited boarding-houses is kept by the Secretary of the Students' Christian Association, and students are recommended to consult him with reference to the selection of suitable accommodation.

## UNIVERSITY RESIDENCES

By the generosity of Mr. and Mrs. E. C. Witney and other friends, the University can now offer to some hundred and fifty men the peculiar advantages of residential life and excellent accommodation within its own grounds. The Residence, opened in November, 1908, consists of three Houses situated on the north side of Hoskin Avenue, opening upon a quadrangle, the fourth side of which is formed by Devonshire Place. They stand about two hundred yards to the north of University College and close to Hart House to which is attached the University Dining Hall. The buildings are known as the South, East and North Houses.

Each House contains twenty-four single rooms, one single suite, one double room and eleven suites, a suite comprising a study and two bedrooms. A large room in each building, with an open hearth and a library has been set aside as a common room. A lavatory with hot and cold shower baths is provided for every eight men. The buildings are heated by steam and lighted by electricity.

The University supplies the table, chairs, book-case, chiffonier, bed, mattress, pillows, linen and window shades for each room; it is prepared to furnish a drop-light for a nominal rental.

Each occupant is charged \$4.00 room-rent per week, payable to the Bursar four weeks in advance. The charge for each single suite is \$5.00 per week. These charges cover heat, light, house-service, house-laundry, and the use of the telephone. There is no separate dining hall connected with the Residence, but board may be obtained at the adjacent University Dining Hall.

Applications for rooms must be made in writing to the Secretary of the Residence Committee (address the Registrar's Office) and must be accompanied by a deposit of \$5.00. This deposit will be returned if the application be not granted, and will be forfeited if a room is assigned to the applicant and not taken by him, unless notice of his refusal of the room be received by the Secretary in writing before September 22nd. It will be returned in full at the end of the College year if the room key be given

back and the room and furniture left in a satisfactory condition. The following principles govern the allotment of rooms: (i) No student who, as a result of the annual Spring examinations, is not assured of being able to proceed to a subsequent year, will be admitted into the Residence. Exception to this rule will be made in the case of a student in the Faculty of Medicine who has obtained standing at the May examination, but is debarred by the rules of that Faculty from proceeding to the subsequent year until he has passed his Supplemental examinations. Such a student will be assigned a room provisionally, but cannot occupy it unless he passes his Supplemental examinations in September. (ii) The rooms in each House will be distributed between the various Faculties and Years. (iii) A limited number of rooms will be reserved for members of the incoming First Year until September 12th. (iv) Applications will be considered in order of priority.

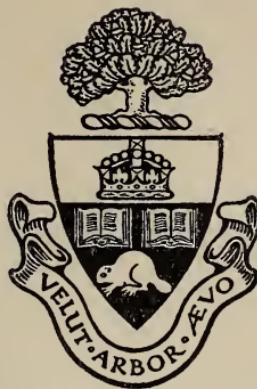
The University lays down three general rules, designed to prevent hazing, the use of intoxicants and gambling. The students in each House shall elect a House Committee, which is entrusted by the University with the making and enforcing of any other needed rules and with the maintenance of order. A member of the Faculty resides in each House to act as friend and adviser to the men in residence.

## SUMMARY OF STUDENTS IN ATTENDANCE

SESSION 1921-1922



# UNIVERSITY OF TORONTO



## CALENDAR OF THE FACULTY OF APPLIED SCIENCE AND ENGINEERING

1923-1924



## CONTENTS

	PAGE
CALENDAR.....	5
FACULTY LISTS.....	7
HISTORICAL SKETCH.....	14
MATRICULATION.....	15
ADMISSION.....	16
DEGREES.....	17
FEES.....	18, 19
SCHOLARSHIPS.....	19
REGULATIONS RESPECTING EXAMINATIONS.....	20, 21
VACATION WORK, SHOP WORK, ETC.....	21, 22
REGULATIONS RESPECTING TERM WORK.....	23
INFORMATION FOR STUDENTS.....	24
DEPARTMENT OF CIVIL ENGINEERING.....	28
"        MINING ENGINEERING.....	33
"        MECHANICAL ENGINEERING.....	36
"        ARCHITECTURE.....	39
"        CHEMICAL ENGINEERING.....	42
"        ELECTRICAL ENGINEERING.....	45
"        METALLURGICAL ENGINEERING.....	48
OUTLINE OF LECTURE AND LABORATORY COURSES.....	50
SCHOOL OF ENGINEERING RESEARCH.....	50
LABORATORY EQUIPMENT.....	93
LIBRARY.....	106
ROYAL ONTARIO MUSEUM.....	106
ENGINEERING AND AFFILIATED SOCIETIES.....	109
LODGING AND BOARD, RESIDENCES.....	113
SUMMARY OF STUDENTS IN ATTENDANCE.....	114

1923

## CALENDAR

1923

JANUARY	FEBRUARY	MARCH	APRIL
Sun. . . 7 14 21 28 Mon. . . 1 8 15 22 29 Tues. . . 2 9 16 23 30 Wed. . . 3 10 17 24 31 Thur. . . 4 11 18 25 .. Fri. . . 5 12 19 26 .. Sat. . . 6 13 20 27 ..	Sun. . . 4 11 18 25 Mon. . . 5 12 19 26 .. Tues. . . 6 13 20 27 .. Wed. . . 7 14 21 28 .. Thur. . . 1 8 15 22 .. Fri. . . 2 9 16 23 .. Sat. . . 3 10 17 24 ..	Sun. . . 4 11 18 25 Mon. . . 5 12 19 26 .. Tues. . . 6 13 20 27 .. Wed. . . 7 14 21 28 .. Thur. . . 1 8 15 22 29 .. Fri. . . 2 9 16 23 30 .. Sat. . . 3 10 17 24 31 ..	Sun. . . 1 8 15 22 29 .. Mon. . . 2 9 16 23 30 .. Tues. . . 3 10 17 24 31 .. Wed. . . 4 11 18 25 .. Thur. . . 5 12 19 26 .. Fri. . . 6 13 20 27 .. Sat. . . 7 14 21 28 ..
MAY	JUNE	JULY	AUGUST
Sun. . . 6 13 20 27 .. Mon. . . 7 14 21 28 .. Tues. . . 8 15 22 29 .. Wed. . . 9 16 23 30 .. Thur. . . 10 17 24 31 .. Fri. . . 11 18 25 .. Sat. . . 12 19 26 ..	Sun. . . 3 10 17 24 .. Mon. . . 4 11 18 25 .. Tues. . . 5 12 19 26 .. Wed. . . 6 13 20 27 .. Thur. . . 7 14 21 28 .. Fri. . . 8 15 22 29 .. Sat. . . 9 16 23 30 ..	Sun. . . 1 8 15 22 29 .. Mon. . . 2 9 16 23 30 .. Tues. . . 3 10 17 24 31 .. Wed. . . 4 11 18 25 .. Thur. . . 5 12 19 26 .. Fri. . . 6 13 20 27 .. Sat. . . 7 14 21 28 ..	Sun. . . 5 12 19 26 .. Mon. . . 6 13 20 27 .. Tues. . . 7 14 21 28 .. Wed. . . 8 15 22 29 .. Thur. . . 9 16 23 30 .. Fri. . . 10 17 24 31 .. Sat. . . 11 18 25 ..
SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Sun. . . 2 9 16 23 30 .. Mon. . . 3 10 17 24 .. Tues. . . 4 11 18 25 .. Wed. . . 5 12 19 26 .. Thur. . . 6 13 20 27 .. Fri. . . 7 14 21 28 .. Sat. . . 8 15 22 29 ..	Sun. . . 7 14 21 28 .. Mon. . . 8 15 22 29 .. Tues. . . 9 16 23 30 .. Wed. . . 10 17 24 31 .. Thur. . . 11 18 25 .. Fri. . . 12 19 26 .. Sat. . . 13 20 27 ..	Sun. . . 4 11 18 25 .. Mon. . . 5 12 19 26 .. Tues. . . 6 13 20 27 .. Wed. . . 7 14 21 28 .. Thur. . . 8 15 22 29 .. Fri. . . 9 16 23 30 .. Sat. . . 10 17 24 ..	Sun. . . 2 9 16 23 30 .. Mon. . . 3 10 17 24 31 .. Tues. . . 4 11 18 25 .. Wed. . . 5 12 19 26 .. Thur. . . 6 13 20 27 .. Fri. . . 7 14 21 28 .. Sat. . . 8 15 22 29 ..

1924

## CALENDAR

1924

JANUARY	FEBRUARY	MARCH	APRIL
Sun. . . 6 13 20 27 .. Mon. . . 7 14 21 28 .. Tues. . . 8 15 22 29 .. Wed. . . 9 16 23 30 .. Thur. . . 10 17 24 3 .. Fri. . . 11 18 25 .. Sat. . . 12 19 26 ..	Sun. . . 3 10 17 24 .. Mon. . . 4 11 18 25 .. Tues. . . 5 12 19 26 .. Wed. . . 6 13 20 27 .. Thur. . . 7 14 21 28 .. Fri. . . 8 15 22 29 .. Sat. . . 9 16 23 ..	Sun. . . 2 9 16 23 30 .. Mon. . . 3 10 17 24 31 .. Tues. . . 4 11 18 25 .. Wed. . . 5 12 19 26 .. Thur. . . 6 13 20 27 .. Fri. . . 7 14 21 28 .. Sat. . . 8 15 22 29 ..	Sun. . . 6 13 20 27 .. Mon. . . 7 14 21 28 .. Tues. . . 8 15 22 29 .. Wed. . . 9 16 23 30 .. Thur. . . 10 17 24 31 .. Fri. . . 11 18 25 .. Sat. . . 12 19 26 ..
MAY	JUNE	JULY	AUGUST
Sun. . . 4 11 18 25 .. Mon. . . 5 12 19 26 .. Tues. . . 6 13 20 27 .. Wed. . . 7 14 21 28 .. Thur. . . 8 15 22 29 .. Fri. . . 9 16 23 30 .. Sat. . . 10 17 24 31 ..	Sun. . . 1 8 15 22 29 .. Mon. . . 2 9 16 23 30 .. Tues. . . 3 10 17 24 .. Wed. . . 4 11 18 25 .. Thur. . . 5 12 19 26 .. Fri. . . 6 13 20 27 .. Sat. . . 7 14 21 28 ..	Sun. . . 6 13 20 27 .. Mon. . . 7 14 21 28 .. Tues. . . 8 15 22 29 .. Wed. . . 9 16 23 30 .. Thur. . . 10 17 24 31 .. Fri. . . 11 18 25 .. Sat. . . 12 19 26 ..	Sun. . . 3 10 17 24 31 .. Mon. . . 4 11 18 25 .. Tues. . . 5 12 19 26 .. Wed. . . 6 13 20 27 .. Thur. . . 7 14 21 28 .. Fri. . . 8 15 22 29 .. Sat. . . 9 16 23 30 ..
SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Sun. . . 7 14 21 28 .. Mon. . . 8 15 22 29 .. Tues. . . 9 16 23 30 .. Wed. . . 10 17 24 .. Thur. . . 11 18 25 .. Fri. . . 12 19 26 .. Sat. . . 13 20 27 ..	Sun. . . 5 12 19 26 .. Mon. . . 6 13 20 27 .. Tues. . . 7 14 21 28 .. Wed. . . 8 15 22 29 .. Thur. . . 9 16 23 30 .. Fri. . . 10 17 24 31 .. Sat. . . 11 18 25 ..	Sun. . . 2 9 16 23 30 .. Mon. . . 3 10 17 24 .. Tues. . . 4 11 18 25 .. Wed. . . 5 12 19 26 .. Thur. . . 6 13 20 27 .. Fri. . . 7 14 21 28 .. Sat. . . 8 15 22 29 ..	Sun. . . 7 14 21 28 .. Mon. . . 8 15 22 29 .. Tues. . . 9 16 23 30 .. Wed. . . 10 17 24 31 .. Thur. . . 11 18 25 .. Fri. . . 12 19 26 .. Sat. . . 13 20 27 ..

## CALENDAR 1923-1924

- 1923—Aug. 18 Saturday....Students Third Year, Dept. 1, report at Summer Survey Camp.
- Aug. 25 Saturday....Students Third Year, Dept. 2, report at Summer Survey Camp.
- Sept. 1 Saturday....Last day for receiving applications for supplemental examinations.
- Sept. 25 Tuesday....The opening address by the President to the students of all the Faculties at 3 p.m. in Convocation Hall.
- Sept. 28 Friday.....Meeting of Faculty Council.
- Oct. 1 Monday.....Registration in person of the first and second years.
- Oct. 2 Tuesday.....Registration in person of the third and fourth years.
- Oct. 3 Wednesday..Lectures and laboratory work commence at 9 a.m.
- Oct. 5 Friday.....Meeting of Faculty Council.
- Oct. 6 Saturday....Stated meeting of the Caput to deal with requests as to social functions until November 15.
- Oct. 10 Wednesday..Interfaculty Track Meet. University Buildings closed after 1 p.m.
- Oct. 12 Friday.....Meeting of Senate.
- Oct. 17 Wednesday..First meeting of Engineering Society.
- Oct. 31 Wednesday..Meeting of Engineering Society.
- Nov. 2 Friday.....Meeting of Faculty Council.
- Nov. 9 Friday.....Meeting of Senate.
- Nov. 10-12 Saturday-Monday inclusive..Thanksgiving. University Buildings closed.
- Nov. 14 Wednesday..Meeting of Engineering Society.
- Nov. 28 Wednesday..Meeting of Engineering Society.
- Dec. 7 Friday.....Meeting of Faculty Council.
- Dec. 14 Friday.....Meeting of Senate.
- Dec. 19 Wednesday..Last day of lectures. Term ends at 5 p.m.

- 1924—Jan. 3 Thursday....Easter Term begins. Mid-session examinations commence.
- Jan. 4 Friday.....Meeting of Faculty Council.
- Jan. 7 Monday.....Lectures and laboratory work commence at 9 a.m.
- Jan. 9 Wednesday..Assembly of the students of all Faculties in Convocation Hall at 12.10 p.m.
- Jan. 11 Friday.....Meeting of Senate.
- Jan. 16 Wednesday..Meeting of Engineering Society.

1924—Jan. 30 Wednesday.. Meeting of Engineering Society.  
Feb. 1 Friday..... Meeting of Faculty Council.  
Feb. 8 Friday..... Meeting of Senate.  
Feb. 13 Wednesday.. Meeting of Engineering Society.  
Feb. 28 Wednesday.. Meeting of Engineering Society.  
Mar. 7 Friday..... Meeting of Faculty Council.  
Annual elections of Engineering Society.  
Mar. 14 Friday..... Meeting of Senate.  
Apr. 4 Friday..... Meeting of Faculty Council.  
Apr. 5 Saturday....Second term ends. Lectures and laboratory  
work end at 12 noon.  
Apr. 10 Thursday....Annual Examinations commence.  
Apr. 11 Friday..... Meeting of Senate.  
Apr. 18-21 Friday-Monday inclusive.. Easter. University Build-  
ings closed.  
Apr. 25 Friday..... Meeting of Senate.  
May 2 Friday..... Meeting of Faculty Council.  
May 9 Friday..... Meeting of Senate.  
June 4 Wednesday.. Meeting of Senate.  
June 6 Friday..... University Commencement.

# UNIVERSITY OF TORONTO

## FACULTY OF APPLIED SCIENCE AND ENGINEERING

<i>President.....</i>	SIR ROBERT A. FALCONER, K.C.M.G., LL.D., D.LITT.
<i>Dean of Faculty..</i>	BRIG.-GENERAL C. H. MITCHELL, C.B., C.M.G., C.E., LL.D., D.Eng.
<i>Secretary of Faculty.....</i>	S. G. BENNETT, M.C., B.A.Sc.
<i>Bursar.....</i>	F. A. MOURÉ, Mus. Doc.
E. A. ALLCUT, M.Sc., Mem. A.S.M.E., <i>Associate Professor of Thermodynamics.</i>	208 Dundas St. E.
G. R. ANDERSON, M.A., <i>Associate Professor of Engineering Physics.</i>	72 Isabella St.
R. W. ANGUS, B.A.Sc., Mem. A.S.M.E., <i>Professor of Mechanical Engineering.</i>	42 Howland Ave.
E. G. R. ARDAGH, B.A.Sc., <i>Associate Professor of Chemical Engineering.</i>	148 Howard Park Ave.
J. W. BAIN, B.A.Sc., F.I.C., <i>Professor of Chemical Engineering.</i>	393 Brunswick Ave.
E. W. BANTING, B.A.Sc., <i>Assistant Professor of Surveying.</i>	330 St. George St.
ADRIAN BERRINGTON M.S.A. (London), <i>Associate Professor of Architecture.</i>	(ob.)
M. C. BOSWELL, M.A., Ph.D., <i>Associate Professor of Organic Chemistry.</i>	Walsingham Apts.
J. R. COCKBURN, M.C., B.A.Sc., M.E.I.C., <i>Associate Professor of Descriptive Geometry.</i>	100 Walmer Road
S. R. CRERAR, B.A.Sc., D.L.S., <i>Assistant Professor of Surveying.</i>	122 Grenadier Road
F. C. DYER, B.A.Sc., <i>Assistant Professor of Mining Engineering.</i>	233 Ashworth Ave.
O. W. ELLIS, M.Sc., <i>Assistant Professor of Metallurgical Engineering.</i>	539 Church St.
P. GILLESPIE, M.Sc., C.E., M.E.I.C., <i>Professor of Civil Engineering.</i>	358 Davenport Rd.
G. A. GUESS, M.A. <i>Professor of Metallurgy.</i>	Oakville, Ont.
H. E. T. HAULTAIN, C.E., M.I.M.M., <i>Professor of Mining Engineering.</i>	50 St. George St.
J. T. KING, B.A.Sc., <i>Assistant Professor of Mining Engineering.</i>	126 Manor Road
A. T. LAING, B.A.Sc., <i>Associate Professor of Applied Mechanics.</i>	146 Balmoral Rd.

## 8 UNIVERSITY OF TORONTO CALENDAR 1923-1924

T. R. LOUDON, B.A.Sc., M.E.I.C., <i>Associate Professor of Applied Mechanics.</i>	189 Sheldrake Blvd.
A. W. McCONNELL, B.A.Sc., M.R.A.I.C., <i>Associate Professor of Architecture.</i>	36 Prince Arthur Ave. (On leave of absence)
J. McGOWAN, B.A., B.A.Sc., <i>Professor of Applied Mechanics.</i>	Electrical Building
J. H. PARKIN, B.A.Sc., M.E., <i>Assistant Professor of Mechanical Engineering.</i>	10 Columbine Ave.
H. W. PRICE, B.A.Sc., <i>Professor of Electrical Engineering.</i>	474 Palmerston Blvd.
T. R. ROSEBRUGH, M.A., <i>Professor of Electrical Engineering.</i>	92 Walmer Road
W. J. SMITHER, B.A.Sc., <i>Assistant Professor of Structural Engineering.</i>	40 Wellesley St.
L. B. STEWART, O.L.S., D.T.S., <i>Professor of Surveying and Geodesy.</i>	17 Admiral Road
R. TAYLOR, B.A.Sc., <i>Assistant Professor of Hydraulics.</i>	Islington, Ont.
W. M. TREADGOLD, B.A., <i>Associate Professor of Surveying.</i>	13 Woodlawn Ave. E.
C. H. C. WRIGHT, B.A.Sc., M.R.A.I.C., <i>Professor of Architecture.</i>	419 Markham St.
C. R. YOUNG, B.A.Sc., C.E., M.E.I.C., <i>Associate Professor of Structural Engineering.</i>	98 Hilton St.
A. R. ZIMMER, B.A.Sc., <i>Assistant Professor of Electrical Engineering.</i>	80 Pine Crest Road

### SESSIONAL APPOINTMENTS.

C. G. R. ARMSTRONG, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	350 Montrose Ave.
S. G. BENNETT, M.C., B.A.Sc., <i>Lecturer in Commercial Engineering.</i>	121 Spadina Road
FREDERICK COATES, A.R.C.A., <i>Instructor in Modelling.</i>	West Hill, Ont.
S. K. CHENEY, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	127 Givens St.
J. E. CLARK, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	140 Galley Ave.
A. R. CLUTE, B.A., LL.B., <i>Special Lecturer in Limited Companies.</i>	47 Elgin Ave.
H. C. CRANE, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	50 Simpson Ave.
J. J. CRAWFORD, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	85 Bloor St. E.

FACULTY OF APPLIED SCIENCE AND ENGINEERING 9

J. H. CURZON,	Lynne and Warden Aves.
Demonstrator in Engineering Drawing.	
W. L. DICKSON, B.A.Sc.,	76 Pinewood Ave.
Demonstrator in Engineering Drawing.	
H. M. DILWORTH, B.A.Sc.,	259 Howland Ave.
Demonstrator in Engineering Physics.	
F. P. DOWNEY, M.A.Sc.,	697 Dupont St.
Demonstrator in Chemical Engineering.	
W. B. DUNBAR, B.A.Sc.,	241 Glebeholme Blvd.
Instructor in Engineering Drawing.	
W. C. C. DUNCAN, B.A.Sc.,	196 Ellsworth Ave.
Demonstrator in Electrical Engineering.	
H. B. DUNNINGTON GRUBB,	16 Vermont Ave.
Special Lecturer in Landscape Architecture.	
H. J. FRANKLIN, B.A.Sc.,	72 Delaware Ave.
Instructor in Engineering Drawing.	
J. R. GILLEY, B.A.Sc.,	52 Gloucester St.
Demonstrator in Engineering Drawing.	
W. A. GOLDING,	103 Howard St.
Temporary Instructor in Architecture.	
W. J. GRANT, B.A.Sc.,	83 Quebec Ave.
Demonstrator in Chemical Engineering.	
W. S. FERGUSON, C.A.,	52 Tranby Ave.
Lecturer in Accountancy.	
W. H. GREAVES,	Aurora, Ont.
Special Lecturer in Public Speaking.	
W. F. GREEN, M.A.,	
Demonstrator in Mining Engineering.	
W. S. GUEST, B.A.Sc.,	30 McMaster Ave.
Lecturer in Electrical Engineering.	
A. E. HAMILTON, B.A.Sc.,	4 Grandview Ave.
Demonstrator in Electrical Engineering.	
O. W. HERZBERG, B.A., M.Sc. (McGill),	Hart House, U. of T.
Demonstrator in Chemical Engineering.	
U. C. HOLLAND, B.A.Sc.,	93 Pacific Ave.
Assistant in Machine Design.	
C. A. HUGHES, M.A.Sc.,	Mimico Beach, Ont.
Demonstrator in Applied Mechanics.	
K. B. JACKSON, B.A.Sc.,	Hart House
Instructor in Engineering Physics.	
C. W. JEFFERY, M.O.S.A.,	York Mills, Ont.
Instructor in Freehand Drawing and Water Colour.	
P. V. JERMYN, B.A.Sc.,	Brighton Apts., 97 Avenue Road
Demonstrator in Engineering Drawing.	
R. E. LAIDLAW, B.A.Sc.,	Canada Life Bldg.
Special Lecturer in Commercial Law.	

10 UNIVERSITY OF TORONTO CALENDAR 1923-1924

MISS J. C. LAING, B.A., <i>Instructor in French.</i>	39 MacFarland Ave.
H. M. LANCASTER, B.A.Sc., <i>Dep't. Public Health, Parliament Bldgs. Special Lecturer in Sanitary Chemistry.</i>	
C. D. LOCKE, B.S., M.A., <i>Lecturer in Chemical Engineering.</i>	154 Grenadier Rd.
J. S. E. MACALLISTER, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	22 Mountview Ave.
G. G. MACDONALD, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	88 Indian Grove
W. G. MCINTOSH, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	138 Briar Hill Ave.
H. H. MADILL, B.A.Sc., M.R.A.I.C., <i>Lecturer in Architecture.</i>	169 Lauder Ave.
G. D. MAXWELL, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	46 Barton Ave.
J. W. MELSON, B.A.Sc., <i>Lecturer in Surveying.</i>	69 Walmsley Blvd.
J. W. MILNE, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	98 Admiral Road
J. M. MUIR, B.A.Sc., <i>Demonstrator in Mining Engineering.</i>	98 Runnymede Road
J. S. PANTER, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	287 Beech Ave.
E. L. PATERSON, B.A.Sc., <i>Demonstrator in Applied Mechanics.</i>	574 Spadina Ave.
E. B. PHILIP, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	Canning Ave., Islington, Ont.
M. V. POWELL, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	110 Yorkville Ave.
W. B. RAMSAY, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	142 Bloor St. W.
J. T. RANSOM, B.A.Sc., D.L.S., <i>Demonstrator in Engineering Physics.</i>	171 Arlington Ave.
O. ROLFSON, M.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	99 Farnham Ave.
W. L. SAGAR, B.A.Sc., <i>Demonstrator in Applied Mechanics.</i>	Apt. 1, 114 Carlton St.
S. C. SCADDING, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	87A Chester Ave.
H. L. SEYMOUR, C.E., <i>Special Lecturer in Town Planning.</i>	504 Excelsior Life Bldg.
S. S. SMILLIE, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	24 Galley Ave.
F. R. TAYLOR, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	13 Boustead Ave.

FACULTY OF APPLIED SCIENCE AND ENGINEERING 11

R. J. THOMPSON, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	197 Withrow Ave.
J. E. TOOMER, B.S., <i>Lecturer in Metallurgical Engineering.</i>	328 Brunswick Ave.
A. G. TURNBULL, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	51 Ann St.
H. A. TUTTLE, B.A.Sc., <i>Lecturer in Mechanical Engineering.</i>	Hart House
A. L. WARD, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	15 Close Ave.
J. J. WEICKER, B.A.Sc., <i>Demonstrator in Mechanical Engineering.</i>	1449 Gerrard St. E.
R. J. WILLIAMSON, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	74 Langley Ave.
A. C. WILSON, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	283 Evelyn Ave.
G. R. WORKMAN, <i>Demonstrator in Engineering Drawing.</i>	22 Helena Ave.
W. J. T. WRIGHT, B.A.Sc., <i>Lecturer in Engineering Drawing.</i>	126 Melrose Ave.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION TO  
STUDENTS IN APPLIED SCIENCE.

S. BEATTY, Ph.D., <i>Associate Professor of Mathematics.</i>	537 Markham St.
J. T. BURT-GERRANS, M.A., Phm.B., <i>Assistant Professor of Electrochemistry.</i>	46 Dewson St.
J. H. CAMERON, M.A., <i>Professor of French.</i>	96 Admiral Road
C. A. CHANT, M.A., Ph.D., <i>Professor of Astro-Physics.</i>	201 Madison Ave.
A. T. DELURY, M.A., <i>Professor of Mathematics.</i>	74 St. Albans St.
B. FAIRLEY, M.A., Ph.D., <i>Associate Professor of German.</i>	22 Kendal Ave.
J. H. FAULL, B.A., Ph.D., <i>Professor of Botany.</i>	102 Yorkville Ave.
C. R. FAY, M.A., D.Sc., <i>Professor of History of Economics.</i>	88 St. George St.
J. G. FITZGERALD, M.B., <i>Professor of Hygiene.</i>	186 Balmoral Ave.
D. T. FRASER, M.B., D.P.H., <i>Assistant Professor of Hygiene and Preventive Medicine.</i>	York Mills, Ont.
T. HEDMAN, Ph.D., <i>Assistant Professor of German.</i>	Old Forest Hill Road
G. E. HOLT, M.A., Mus.Bac., <i>Lecturer in German.</i>	280 Bloor St. West
F. B. KENRICK, M.A., Ph.D., <i>Professor of Chemistry.</i>	77 Lonsdale Road
W. J. LOUDON, B.A., <i>Professor of Mechanics.</i>	Cooksville, Ont.
A. MACLEAN, B.A., <i>Assistant Professor of Geology.</i>	22 Havelock St.
W. L. MILLER, B.A., Ph.D., <i>Professor of Physical Chemistry.</i>	8 Hawthorne Ave.
E. S. MOORE, M.A., Ph.D., <i>Professor of Economic Geology.</i>	53 Hewitt Ave.
G. H. NEEDLER, B.A., Ph.D., <i>Professor of German.</i>	103 Bedford Road
W. A. PARKS, B.A., Ph.D., <i>Professor of Palaeontology.</i>	69 Albany Ave.
A. L. PARSONS, B.A., <i>Associate Professor of Mineralogy.</i>	72 Isabella St.

I. R. POUNDER, M.A., <i>Assistant Professor of Mathematics.</i>	19 Glen Gordon Road
L. J. ROGERS, B.A.Sc., <i>Assistant Professor of Analytical Chemistry.</i>	29 Rosemount Ave.
H. B. SPEAKMAN, M.Sc., <i>Associate Professor of Zymology.</i>	61 Walmsley Blvd.
J. L. SYNGE, B.A., <i>Assistant Professor of Mathematics.</i>	183 Huron St.
J. E. THOMSON, B.A.Sc., <i>Assistant Professor of Mineralogy.</i>	57 Queen's Park
E. M. WALKER, B.A., M.B., <i>Associate Professor of Biology.</i>	67 Alcina Ave.
T. L. WALKER, M.A., Ph.D., <i>Professor of Mineralogy.</i>	20 Avondale Ave.

## SESSIONAL APPOINTMENTS.

A. R. GORDON, B.A., <i>Demonstrator in Electrochemistry.</i>	Alexandra Palace
A. H. HEATLEY, B.A.Sc., <i>Demonstrator in Electrochemistry.</i>	14 Russell St.
H. C. RICKABY, B.A., <i>Demonstrator in Mineralogy.</i>	•58 St. George St.
J. E. SHAW, B.A., Ph.D., <i>Professor of Spanish.</i>	75 Walmer Rd.
MISS M. E. G. WADDELL, M.A., <i>Tutor in Mathematics.</i>	32 Madison Ave.
A. E. R. WESTMAN, M.A., <i>Demonstrator in Electrochemistry.</i>	215 Indian Rd.

## FACULTY OF APPLIED SCIENCE AND ENGINEERING.

### HISTORICAL SKETCH.

The Legislative Assembly during the Session of 1877 gave its sanction to the establishment of a School of Practical Science on the basis proposed in the memorandum of the Minister of Education confirmed by the Lieutenant-Governor in Council on the 3rd day of February, 1877.

By the scheme thus approved of, Government effected an arrangement with the Council of University College whereby the students of the School of Practical Science enjoyed full advantage of the instruction given by its professors and lecturers in all the departments of science which were embraced in the work of the School.

This arrangement was brought to an end in 1889 by the transfer of the department of science above referred to, from University College to the University of Toronto under the operation of the University Federation Act.

In order that the students of the School might continue to enjoy the advantage of the instruction of the above departments, the Senate of the University of Toronto passed a Statute in October, 1889, affiliating the School to the University, which Statute was confirmed by the Lieutenant-Governor on the 30th day of October, 1889.

By an Order-in-Council, approved by the Lieutenant-Governor, on the 6th day of November, 1889, a Principal was appointed, and the management of the School was entrusted to a council composed of the Principal as chairman, and the Professors, Lecturers and Demonstrators appointed on the Teaching Faculty of the School.

By the terms of this order the management and discipline of the School was vested in the Council.

By a Statute of the Senate of the University of Toronto, passed on December 14th, 1900, the teaching staff and examiners of the School of Practical Science, together with the examiners for the degree of B.A.Sc., and professional degrees in Engineering, were constituted ex-officio the Faculty of Applied Science and Engineering of the University of Toronto.

By an Order-in-Council dated the 30th day of January, 1903, the Council of the School was made to consist of the Principal, the Professors and Lecturers, together with the Registrar.

By the University Act, 1906, the School of Practical Science was united to the University of Toronto as its Faculty of Applied Science and Engineering.

## MATRICULATION.

A candidate for admission to the First Year in the Faculty of Applied Science and Engineering must produce satisfactory certificates of good character and of having completed the seventeenth year of his age on or before the first of October of the year in which he proposes to register.

He must also present certificates giving him credit in the following subjects of Pass and Honour Matriculation:

## PASS MATRICULATION

ENGLISH (Literature and Composition)

HISTORY (British and Ancient)

MATHEMATICS (Algebra and Geometry)

Any three of:

LATIN (Authors and Composition)

GREEK (Authors and Composition)

FRENCH (Authors and Composition)

GERMAN (Authors and Composition)

SPANISH (Authors and Composition) *or*

ITALIAN (Authors and Composition)

EXPERIMENTAL SCIENCE (Physics and Chemistry)

## HONOUR MATRICULATION

(At least 50%)

ENGLISH (Literature and Composition).

MATHEMATICS (Algebra, Geometry and Trigonometry).

One of:

LATIN (Authors and Composition).

GREEK (Authors and Composition).

FRENCH (Authors and Composition).

GERMAN (Authors and Composition).

SPANISH (Authors and Composition) *or*

ITALIAN (Authors and Composition).

In selecting the options it is recommended that students take French, German and Experimental Science. In the Department of Architecture, French is required, in the Departments of Chemical Engineering and Mechanical Engineering it is desirable that students take German. For students intending to take Metallurgical Engineering, Spanish and Experimental Science are recommended.

The regulations respecting Matriculation, together with a schedule of examinations which may be accepted as equivalent, may be found in the Curriculum for Matriculation on application to the Registrar of the University.

### ADMISSION.

A candidate for admission must have completed the seventeenth year of his age on or before the first of October of the year in which he seeks to enter.

Applications for admission must be made on blank forms supplied by the Registrar, and should be forwarded as early as possible to the Registrar of the University, together with all Pass and Honour Matriculation or equivalent certificates.

Applications will be considered from (a) those who have completed the pass and honour matriculation requirements, including those who hold, certificates recognized as equivalent—see matriculation curriculum—(b) those who have failed in not more than one of the prescribed subjects of Pass or Honour Matriculation, other than Mathematics. The latter must complete matriculation before being eligible to enter the second year.

Applications based upon other certificates than those mentioned will be considered as occasion may require. Such certificates must be accompanied by an official statement of the marks in the various subjects upon which the certificate was granted.

### ADMISSION AD EUNDEM STATUM.

An undergraduate of another University may be admitted *ad eundem statum* on such conditions as the Senate on the recommendation of the Council of the Faculty may prescribe.

An applicant for admission *ad eundem statum* must submit with his petition (1) a calendar of his University giving a full statement of the courses of instruction; (2) an official certificate of character and academic standing.

### REGISTRATION

Students in any year will be required to register in person on the date specified in the Calendar for the registration of students in that year. Those who present themselves on subsequent days must petition the Council to be allowed to register. Council reserves the right to reject applications of, or impose penalties upon, those who fail to report on the dates specified.

### ENQUIRIES.

Enquiries with reference to requirements of admission to the Faculty of Applied Science and Engineering are to be addressed to the Registrar of the University.

Communications relating to curricula, instruction, examinations and standing therein, in the Faculty of Applied Science and Engineering are to be addressed to the Secretary of the Faculty.

## DEGREES

*Degree of Bachelor of Applied Science (B.A.Sc.).*

*Degree of Bachelor of Architecture (B.Arch.).*

There are six graduating Departments leading to the Degree of Bachelor of Applied Science (B.A.Sc.) and one graduating Department leading to the Degree of Bachelor of Architecture (B.Arch.).

1. Civil Engineering.
2. Mining Engineering.
3. Mechanical Engineering.
4. Architecture.
5. (Discontinued.)
6. Chemical Engineering.
7. Electrical Engineering.
8. Metallurgical Engineering.

The instruction in the Departments leading to the Degree of B.A.Sc. extends over a period of four years and is designed to give the students a thorough knowledge of the scientific principles in the several professions and also such training as will make him immediately useful when he commences professional work.

The instruction in the Department of Architecture leading to the Degree of B.Arch. extends over a period of four years and is designed to give the students a thorough knowledge of the aesthetic and scientific principles underlying the practice of the Architectural profession and also such other training as may make him immediately useful on commencing professional work.

*Degree of Master of Applied Science (M.A.Sc.).*

Graduates holding the Degree of B.A.Sc. of this University or those holding the degree of another University recognized as equivalent, may take post-graduate work proceeding to the Degree of Master of Applied Science (M.A.Sc.).

(For requirements, see page 91.)

*Degree of Master of Architecture (M.Arch.).*

Graduates holding the Degree of B.Arch. or B.A.Sc. in Architecture of this University, or those holding the Degree of another University recognized as equivalent, may take post-graduate work proceeding to the Degree of Master of Architecture (M.Arch.).

(For requirements, see p. 91.)

### *Professional Degrees.*

Graduates in Applied Science and Engineering, and graduates of the School of Practical Science, may, after three years spent in professional work, present themselves for the degrees of Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.),

Chemical Engineer (Chem. E.), Metallurgical Engineer (Met. E.), as the case may be, subject to the rules and regulations established by the University. (See page 91.)

### OPTIONS.

In the fourth year, optional courses are arranged in certain departments. Students are required to submit their selection to the Secretary in writing, not later than September 15th. The proposed selection must be approved by Council before adoption.

### FEES.

All fees are payable at the Bursar's office between the hours 10 a.m. and 1 p.m. of each week day except Saturday.

The annual fees including tuition, library, laboratory supplies and one annual examination for each year shall be as follows:

If paid in full on or before November 5th .....	\$150.00
---	----------

By instalments.

First instalment, if paid on or before November 5th .....	\$75.00
---	---------

Second instalment, if paid on or before February 5th .....	78.00
--	-------

### REPEATING THE YEAR.

If paid in full on or before November 5th .....	\$75.00
---	---------

The above fees are payable in advance. After November 5th a penalty of \$1.00 per month will be imposed until the whole amount is paid. In the case of payment by instalments the same rule as to penalty will apply.

Students must have paid the fees due in the first term before proceeding to the work of the second term.

### GENERAL FEES.

Matriculation, or registration of Matriculation .....	\$5.00
Supplemental examination .....	10.00
Admission <i>ad eundem statum</i> .....	10.00
Hart House .....	11.00
Degree of B.A.Sc. (payable not later than April 1st) .....	10.00
Degree of M.A.Sc. .....	25.00
M. Arch .....	25.00
Physical Training .....	5.00

### DUES AND DEPOSITS

(Payable to the Secretary of the Faculty at the time of registration.)

Engineering Society membership .....	\$2.00
Athletic Association membership .....	1.00
Annual deposit, Departments 1, 3, 4, 7 .....	3.00
Departments 2, 6, 8 .....	8.00

Charges for waste, neglect and breakage are to be met out of the deposit fee, the balance of which will be refunded to the student at the end of the session on application to the Secretary.

If the foregoing deposits do not cover the cost of breakage due to carelessness or neglect, the balance shall be paid by the student to the Secretary and in default of such payment the results of his examination will be withheld.

#### HART HOUSE AND THE STUDENTS ADMINISTRATIVE COUNCIL

The annual fee.....	\$11.00
---------------------	---------

Every male student in attendance, proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering, is required to pay to the Bursar at the time of the entry of his name with the Secretary the annual fee of eleven dollars for the maintenance of Hart House and the Students' Administrative Council.

#### PHYSICAL TRAINING FEE

The annual fee.....	\$5.00
---------------------	--------

Every male student in attendance proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering is required to pay to the Bursar the annual Physical Training fee of \$5.00 at the opening of each session in which Physical Training is compulsory for that student.

A student who has failed to complete satisfactorily the course in Physical Training prescribed for the First Year will not be permitted to register in the Third Year; and the student who has failed to complete satisfactorily the course in Physical Training prescribed for the Second Year will not be permitted to register in the Fourth Year.

#### SUPPLEMENTARY PHYSICAL TRAINING FEE

Supplemental Fee.....	\$10.00
-----------------------	---------

Every student who has neglected to complete satisfactorily the course in Physical Training of the First or Second Year, and who must take this work during the Second or Third Year respectively of his course, will be required to pay to the Bursar at the opening of the session a Supplemental Fee of \$10.00, in addition to the prescribed Physical Training fee.

#### SCHOLARSHIPS

##### BOILER INSPECTION AND INSURANCE COMPANY SCHOLARSHIP

The Boiler Inspection and Insurance Company of Canada offers a Scholarship in the Department of Mechanical Engineering of the value of \$150.00 to the student who obtains highest Honour Standing in the regular examinations of the third year.

The successful candidate will be expected to proceed to his fourth year during the session next following the date of the award.

The amount of the award will be credited by the Bursar to the fees of the fourth year of the successful candidate.

**ONTARIO ASSOCIATION OF ARCHITECTS' ARCHITECTURAL SCHOLARSHIP**

The Ontario Association of Architects offers a scholarship in the Department of Architecture of the value of \$100 to the student who has obtained the highest standard of general proficiency during the first year. This scholarship will be awarded annually in May, 1922 to 1926 inclusive.

**TORONTO ARCHITECTURAL GUILD MEDAL**

The Toronto Architectural Guild was the organization of local architects from which sprung the Ontario Association of Architects. When the new and wider association became firmly established, the Guild disbanded and handed over to a trustee board certain funds for the establishment of a Medal to be awarded in the Department of Architecture of the University of Toronto.

The Trustee Board, now that the fund has accumulated considerably, announces its intention of awarding this medal annually to a senior student showing outstanding ability in Architectural Design.

**THE UBUKATA FUND**

The S. Ubukata Fund of \$10,000, the gift of Mr. S. Ubukata, provides for the establishment of prizes, medals, scholarships and loans for which Japanese students of all faculties and colleges may be eligible. Information regarding the conditions of award may be obtained from the Registrar of the University.

**JUNIOR INSTRUCTORSHIPS**

Provision is made for the sessional appointment in various departments of graduates as Fellows or Demonstrators, whose duties shall consist of aiding in the work of instruction under the direction of the department concerned.

Applications for appointment should be made in writing to the Secretary of the Faculty not later than September 1st.

**REGULATIONS RESPECTING EXAMINATIONS****REGULAR EXAMINATIONS**

Promotions from one year to another are made on the results of the annual examinations. A student proceeding to a degree must pass all the examinations in the subjects of his course and at the periods arranged from time to time by the Council.

Candidates who fail in passing the annual examinations will be required to take again the whole course of instruction, both theoretical and practical, of the year in which they fail before presenting themselves a second time for examination. (This repetition includes vacation work.)

A student who in either term of the session fails to perform the work of his course in a manner satisfactory to the professors in charge, will not be allowed to present himself at the final examinations of the year.

In the second, third and fourth years annual examinations will be held at the beginning of the second term on all subjects completed during the first term.

No student will be allowed to write at the annual examinations who has not paid all fees and dues for which he is liable.

The pass marks required on written examinations is 40% and on practical examinations 60%.

Honours will be granted in each department to the students who obtain at least 50 per cent. in each subject, and 75 per cent. of the total number of marks allotted to the department at the annual examinations.

Honour Graduate standing will be granted to those who obtain honours in the final and in one previous year.

#### TERM EXAMINATIONS

Term examinations may be held in any subject and at any time at the discretion of the instructor or by order of the Council, and the results of such examination may, if the Council so decides, be incorporated with those of the annual examinations in the same subjects.

#### SUPPLEMENTAL EXAMINATIONS

A candidate who fails in one or two subjects at the Annual Examinations will be required to take supplemental examinations in such subjects.

The supplemental written examinations will begin on the 24th of September, 1923. Candidates are required to send to the Secretary of the Faculty not later than the 1st of September, notice in writing of their intention to take such examinations (including practical), and to remit at the same time to the Bursar the fee of \$10.00. Arrangements will be made to conduct supplemental examinations at the survey camp for those students in attendance. A penalty of \$1.00 will be imposed upon all candidates who fail to give notice within the time stated.

In the case where a candidate fails to pass a supplemental examination it will count as one of the two supplemental examinations which may be allowed him after the next annual examination.

#### VACATION WORK

Vacation notes must be handed to the Department of Drawing on or before the first day of the session.

Vacation notes must be on construction only, and contain not less than twenty, nor more than thirty pages of sketches. These sketches must be freehand pencil drawings with figured dimensions.

Notes must be made in standard note books approved of by the Faculty. Notes which have been taken during the session in connection with the work in drawing will not count as vacation work.

The minimum percentage of marks required for practical work must be made in the case of vacation notes.

### VACATION LETTERS

#### *Department of Mining Engineering*

THIRD YEAR STUDENTS:—Four letters to be written and mailed to the Professor of Mining Engineering, one each month, June, July, August and September; at least one letter must deal with a labour episode.

FOURTH YEAR STUDENTS:—The student may select either one of the following alternatives:—

- A. Four letters to be written and mailed, one each month, June, July, August and September; at least one letter to be on a labour episode: or
- B. One letter describing a labour episode to be written and mailed to the Professor of Mining Engineering not later than June 30th, and an article of suitable character and length for submitting to the Engineering Institute of Canada or the Canadian Mining Institute as a student's paper, to be written and mailed to the Professor of Mining Engineering not later than September 30th.

### FIELD EXPERIENCE

#### *Department of Mining Engineering*

The following are the regulations governing field experience certificates:

Candidates for the degree in the Department of Mining Engineering will be required to present satisfactory evidence of having had at least six months' practical experience in work connected with mining, metallurgy or geology, for which they must have received regular wages.

The time may be spent on geological survey, in ore dressing, smelter or lixiviation works, in an assay office in the vicinity of mining or metallurgical works, on any work in or about a mine other than as an office man or clerk, or in prospecting. Not more than three months on geological surveys will be accepted, and prospecting will only count one-half (*i.e.*, four months' prospecting will be counted as two months) and must not be submitted for more than three of the six months.

In addition to the above, two months must be spent as office man or clerk.

Certificates must be made out, signed, countersigned and sent during the first term to the Secretary of the Faculty of Applied Science and Engineering, who will retain them.

### SHOP WORK

#### *Departments of Mechanical and Electrical Engineering*

Students in Mechanical and in Electrical Engineering are not granted their degree until certificates have been submitted to the Council, and accepted as satisfactory, showing not less than 1,600 hours of mechanical experience in production under commercial conditions. Preferably the work undertaken should be in one of the manufacturing industries or trades with which the course is related. Certificates must be presented during the first term.

It is not desirable that a student in these courses should enter the engineering industries without having acquired some experience in mechanical production and it is best to obtain this experience under commercial conditions, so that he can appreciate shop conditions and limitations.

### REGULATIONS RESPECTING TERM WORK

Students working in any laboratory must be governed by the regulations relating thereto as made known from time to time.

No laboratory reports or drawings may be removed from the laboratories without permission. The Council reserves the right to dispose of them as may be thought proper.

### FIELD WORK

Field Work in Surveying of the First and Second Years will be taken on the University grounds, during the first term.

No field notes will be counted which have not been taken in the field and during the hours allotted to such work.

Students taking practical astronomy are required to take observations in the field for time, latitude and azimuth.

### DEPARTMENTAL EXCURSIONS TO POINTS OF INTEREST

As a part of Laboratory Instruction excursions to points of technical interest, both in Toronto and elsewhere, are arranged by the staff. These excursions are treated as laboratory periods with the same requirements as to attendance and reports. The total transportation costs in any one year will probably not exceed Ten Dollars.

### SUMMER SURVEY SESSION

Practical surveying of the Third Year will be taken previous to the opening of the fall term during the months of August and September at the University Survey Camp situated on the shore of Gull Lake, and about five miles from the Village of Minden (lot No. 9 in 13th Concession of the Township of Lutterworth). The camp may be reached by taking the train leaving Lindsay for Haliburton, and getting off at Gelert. Conveyances will be on hand to meet students and take them to the camp. Personal effects must be limited to sixty pounds in weight, which must include two pairs of blankets, or their equivalent; beds and mattresses only will be provided.

Students will report at the camp on the dates shown on page 5.

A field course in Geology will be given students in Department 2 the last week of the session at the camp.

### DRAFTING ROOMS

Drawings and briefs for same, that are required to be finished the first term of the session will not be counted unless finished in that term.

The minimum number of drawings in first and second years shall be twenty-five, and the maximum number thirty-five.

No drawings or briefs for same will be counted which have not been made in the drafting rooms, and during the hours allotted to such work.

### THESES

In the Fourth Year each student is required to prepare a thesis on a subject approved by the Council. The title of the thesis must be sent to the Secretary of the Faculty for approval on or before November 1st, and the completed thesis must be handed in not later than the first day of the second term and shall become the property of the University. The rules governing size, form, etc., may be obtained on application to the Secretary.

### EXEMPTIONS

Applications for exemption from any of the regulations must be made to the Council in writing and the particulars of the case fully stated.

### GENERAL INFORMATION FOR STUDENTS

The Council of University College and the governing bodies of the federated universities and colleges, respectively, have disciplinary jurisdiction over and entire responsibility for the conduct of their students in respect of all matters arising or occurring in or upon their respective college buildings and grounds, including residences.

The councils of such of the faculties as have assigned for their separate use any building or buildings and grounds, including residences, have disciplinary jurisdiction over and entire responsibility for the conduct of all students in their respective faculties in respect of all matters arising or occurring in or upon such building, or buildings and grounds.

In all such cases, and, save as aforesaid, as respects all students to whatsoever college or faculty they may belong, disciplinary jurisdiction is vested in the Caput, but the Caput may delegate its authority in any particular case or by any general regulation to the council or other governing body of the university or college or faculty to which the student belongs.

The Caput has also power and authority to determine by general regulations, or otherwise, to what college, faculty or other body the control of university associations belongs.

If there be any questions as to the proper body to exercise jurisdiction in any matter of discipline which may arise, the same shall be determined by the Caput, whose decision shall be final.

Disciplinary jurisdiction includes the power to impose fines.

Information as to the text-books, instruments and materials to be purchased by the students will be given on registration at the beginning of the session.

**REGULATIONS RESPECTING STUDENTS IN ATTENDANCE**

No student will be enrolled in any year, or be allowed to continue in attendance, whose presence is deemed by the Council to be prejudicial to the interests of the University.

No student will be allowed to repeat the work of any year more than once.

Students proceeding regularly to the degree are required to attend the courses of instruction and the examinations in all subjects prescribed for students of their respective standing, and no student will be permitted to remain in the University who persistently neglects academic work.

Unless special permission is granted by the Council, a student who, at the close of two sessions in the University, has failed to secure standing in his year, will not be permitted registration in the Faculty of Applied Science and Engineering.

All interference on the part of any student with the personal liberty of another by arresting him, or summoning him to appear before any unauthorized tribunal of students, or otherwise subjecting him to any indignity or personal violence, is forbidden by the Caput.

A student who is under suspension, or who has been expelled from a College or from the University, will not be admitted to the University buildings or grounds.

The constitution of every University society or association of students in the Faculty of Applied Science and Engineering and all amendments to any such constitution must be submitted for approval to the Council of the Faculty. All programmes of such societies or associations must, before publication, receive the sanction of the Council of the Faculty through the Dean. Permission to invite any person not a member of the Staff of the University to preside at or address a meeting of any society or association must be similarly obtained.

The name of the University is not to be used in connection with a publication of any kind without the permission of the Caput.

**HART HOUSE**

Hart House, the gift of the Massey Foundation, is so called in memory of Mr. Hart Massey. In its widest interpretation it seeks to provide for all the activities in the undergraduate's life apart from the actual work in the lecture room. It affords all the facilities of a first-rate club. In the beauty of its architecture and the various functions which it performs it is unique on this continent.

Hart House contains completely equipped club rooms, including common rooms, reading room, music room, lecture room, sketch room, photographic dark rooms, the Great Hall, used as a dining hall, a small chapel, rooms reserved for religious organizations in the University, gymnasium, squash courts, swimming pool, running track, rifle range, billiard room, library and Hart House Theatre.

Hart House is open from 8.00 a.m. to 11.15 p.m. daily and meals are served in the Great Hall throughout the academic year. Members are entitled to full privileges of all rooms in the building between these hours and the use of the gymnasium, pool, showers and locker rooms until 6.30 p.m. each day, except Sunday, subject to the regulations of the Athletic Association.

The Library contains a good selection of books of general interest. These books must not be taken from the room.

Music recitals given by the leading musicians in the city take place in the Music Room throughout the year.

The Sketch Room is equipped with all facilities for drawing and painting, and weekly lectures and drawing classes are arranged.

A group of rooms is set apart for the use of the Faculty Union. A dining room and a common room are also reserved for Graduate Members. Five guest rooms are available for the use of guests, for periods of a week or less, at a reasonable charge.

The Warden is entrusted with the general supervision of the whole house in co-operation with the following committees: House, Hall, Library, Music, Billiard, Sketch, Camera and Squash. These committees consist of two senior members, the Warden and a full representation of undergraduates. The undergraduates are elected annually by their fellow students. The Board of Stewards is the Senior Committee and has final control of the House, being directly responsible to the Board of Governors. It consists of the Warden (ex-officio chairman) and representatives of the President of the University, the Board of Governors, the Faculty Union, the Athletic Association, the Graduate Members, the University Y.M.C.A., the Students' Administrative Council and the undergraduate secretaries of all Standing Committees.

Hart House Theatre is an Art Theatre in the University, existing to promote the interests of dramatic art in the widest sense. The theatre is operated by a Board of Syndics, who are responsible to the Governors of the University for its administration. It has always been the policy of the Syndics to encourage the use of the theatre by those recognized dramatic societies within the University which are endeavouring to do serious work. When it is possible to do so, without interfering with the legitimate activities of the Theatre, the Syndics will be glad to allow its use by other student organizations.

All male undergraduates proceeding to a degree in the University are members of Hart House. The annual fee of \$8.00 covers all fees in connection with Hart House and membership in the Athletic Association for the academic year (September to May). Membership Cards may be obtained at the Warden's Office on presentation of the Bursar's receipt for fees paid.

Hart House has no endowment whatsoever and is entirely dependent for its upkeep on the fees received from graduates and undergraduates and from various sources of revenue in the House itself.

Other male students in the University, or students in the affiliated or federated institutions receiving instruction in the University, may become members of Hart House on payment of the required fee at the Warden's office. Should the students of any of these institutions elect to join Hart House in a body the \$8.00 fee still obtains but for individual membership the fee is \$10.00.

Graduates are entitled to the full privileges of Hart House on payment of an annual fee of \$10.00. Out-of-town graduates may become members on payment of an annual fee of \$2.50.

#### STUDENTS' ADMINISTRATIVE COUNCIL

The Students' Administrative Council has been entrusted by the Caput with supervision of the conduct of the students, and has power subject to the approval of the Caput to deal with violations of the regulations governing conduct.

Any student who may be convicted of having taken part in a parade or procession through the city which has not been authorized by the police authorities after application by the Executive of the Students' Administrative Council, will be severely disciplined.

#### UNIVERSITY OF TORONTO ATHLETIC ASSOCIATION

This organization has full control of the Athletic activities of the University undergraduates.

The Athletic Directorate is the executive of this association and is composed of two representatives from the teaching staff, five from the undergraduates and two from the graduates.

The regulations of the A.A.U. of C. require that every student who wishes to participate in athletic contests with outside clubs during the academic session must obtain a permit from the University Athletic Association.

## 1. DEPARTMENT OF CIVIL ENGINEERING

The courses of study in Civil Engineering are designed to give the student a sound training in the fundamental scientific principles on which the practice of the profession is based. The instruction is given by means of lectures and practical work in the field, the drafting room and the laboratory. In this way the student is led to apply the principles developed in the class room.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Optics.....	185	1	2	1	2
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing.....	166	0	11	0	18
Physical Training.....	...	0	2	0	2

### SECOND YEAR

Subject	No.	Hours per week			
		First Team		Second Term	
		Lent.	Labiy	Lect.	Lab'y
Vacation Work.....	286	...	..	..	..
Calculus.....	237	1	0	1	0
Spherical Trigonometry.....	239	1	0	0	0
Elementary Astronomy.....	71	1	0	1	0
Descriptive Geometry.....	162	1	0	1	0
Surveying.....	272, 273	1	9	1	0
Dynamics.....	3	1	0	1	0

## SECOND YEAR—Cont.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	0	0
Inorganic Chemistry A.....	87A	1	0	0	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Geology.....	195	0	0	2	0
Mineralogy.....	257,259	2	1	0	2
Hydrostatics.....	186	0	0	1	1
Heat.....	187	1	1½	0	0
Photography.....	188	1	1½	0	1½
Economics & Finance.....	123	1	0	1	0
Chemical Laboratory.....	89	0	3	0	3
Engineering Drawing.....	169	0	4½	0	13½
Physical Training.....	...	0	2	...	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Survey Camp.....	275	...	...	...	...
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	6	2	0	2	0
Thermodynamics.....	223	1	0	1	2
Hydraulics.....	205, 206	2	0	2	3
Least Squares.....	240	0	0	1	0
Practical Astronomy and Geodesy.....	72, 73	2	2	2	0
Descriptive Geometry.....	164	1	0	0	0
Surveying and Levelling....	274	1	0	1	0
Electricity.....	143	1	3	1	0
Stress Graphics.....	10	1	0	1	0
Cements and Concrete....	11	0	0	1	0
Engineering Geology.....	197	1	0	1	0
Commercial Law.....	124	1	0	1	0
Public Speaking.....	133	1	0	0	0
Mechanics of Materials Laboratory.....	9	0	3	0	0
Engineering Drawing.....	173	0	12	0	15

## FOURTH YEAR

## (a) Astronomy Option

Subject	No.	Hours per week			
		First Term	Second Term	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
*Engineering Geology...	197	1	0	1	0
Astronomy.....	74, 76	2	23	2	0
Geodesy.....	75, 76	2	0	2	23
Photographic Surveying.	191	1	2	0	0

## FOURTH YEAR

## (b) Municipal Engineering Option

Subject	No.	Hours per week			
		First Term	Second Term	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Hydraulics.....	211	1	3	0	0
Structural Design.....	17	1	0	0	5
Miscellaneous Structures	19	0	0	1	0
Hygiene and Bacteri- ology.....	82	1	0	1	6
Biology.....	81	0	5	0	0
*Engineering Geology...	197	1	0	1	0
Sanitary Chemistry.....	117	1	6	0	4
Sanitary Engineering....	280	1	3	1	6
Highway Engineering...	281	1	3	1	3
Municipal Seminar (in- cluding Town Plan- ning).....	282	0	3	0	3
Municipal Administra- tion (including Civics)	132	1	0	1	0

\*Fourth Year 1923-1924 only.

## FOURTH YEAR—(c) Structural Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
*Engineering Geology...	197	1	0	1	0
Physical Metallurgy....	252	1	0	1	0
Structural Design.....	17	1	0	1	0
Mill Building Design....	18	1	0	0	0
Miscellaneous Structures	19	0	0	1	0
Mechanics of Materials Laboratory.....	13	0	3	0	6
Structural Design Draw- ing.....	178	0	22	0	22

## FOURTH YEAR—(d) Hydraulic Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
Hydraulics.....	207, 208, 209	3	10	3	10
Physical Metallurgy....	252	1	0	1	0
*Engineering Geology...	197	1	0	1	0
Structural Design.....	17	1	0	1	0
Mill Building Design....	18	1	0	0	0
Miscellaneous Structures	19	0	0	1	0
Electrical Laboratory...	144	0	0	0	3
Mechanics of Materials Laboratory.....	13	0	6	0	3
Structural Design Draw- ing.....	179	0	4	0	8

\*Fourth Year 1923-1924 only.

## FOURTH YEAR

## (e) Railway Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete.....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
Hydraulics.....	211	1	3	0	0
Special Geology.....	204	0	0	1	1½
*Engineering Geology...	197	1	0	1	0
Physical Metallurgy.....	252	1	0	1	0
Electrical Laboratory...	144	0	0	0	3
Motive Power.....	225	1	0	1	0
Railway and Miscellane- ous Structures.....	20, 19	1	0	1	0
Railway Economics.....	131	2	0	2	0
Railway Location and Design.....	276	1	8	1	6
Mechanics of Materials Laboratory.....	13	0	3	0	6
Structural Design Draw- ing.....	179	0	6	0	6

\*Fourth Year 1923-1924 only.

## 2. DEPARTMENT OF MINING ENGINEERING

This course, originating in 1878 as Assaying and Mining Geology, is designed to give the student a sound training in the fundamental scientific knowledge on which the practice of the various branches of Mining Engineering is based. The field of the Mining Engineer is so wide and his activities so varied that this course has become a very broad one. It is the most inclusive of all the Engineering Courses. In general it is designed in the earlier years to give the student, in addition to the fundamental principles, a good training in the subjects of Engineering essential to all branches, such as drawing, surveying, etc., and then in later years to devote more time to those studies peculiar to Mining Engineering.

Candidates for the degree of B.A.Sc. in this department will be required to present satisfactory evidence of having had at least eight months' practical experience in work connected with Mining, Metallurgy or Geology. Candidates for the degree of M.A.Sc. in this department (see page 91) have splendid opportunities for research work in the Assaying and Ore-dressing laboratories. Investigation and research are becoming more and more an integral part of all Mining operations and this fifth year is a special training in this direction. In addition to some special research work, all candidates for this advanced degree are required to devote some time to the study of the following subjects: Cost Keeping in connection with efficiency and motion study, Patents and Technical Writing.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Mineralogy.....	255, 258	2	1	0	3
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Mining Laboratory.....	50	0	0	0	3
Engineering Drawing.....	166	0	11	0	14
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Notes.....	286				
Descriptive Geometry.....	162	1	0	1	0
Surveying.....	272, 273	1	6	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Inorganic Chemistry A.....	87A	1	0	0	0
Inorganic Chemistry B.....	87B	0	0	1	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Geology.....	195	0	0	2	0
Mineralogy.....	260, 261	1	2	1	2
Mining.....	51	1	3	0	0
Theory of Measurements..	63	1	0	0	0
Ore Dressing.....	57	1	0	0	0
Steam Engines.....	216	0	0	1	0
Theory of Mechanism.....	230	2	0	2	0
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	89, 90	0	6	0	6
Engineering Drawing.....	169	0	3	0	12
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Letters.....	66				
Survey Camp.....	275				
Geological Field Work.....	193				
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	7	2	0	0	0
Hydraulics.....	205	2	0	2	0
Analytical Chemistry.....	88	1	0	1	0
Electricity.....	143	1	0	1	0
Assaying.....	45, 46	1	3	0	3
Economic Geology.....	202, 203	1	0	3	2
Dynamic and Structural Geology.....	198	1	0	1	0
Ore Dressing.....	58, 59	1	3	1	3
Physics of Ore Dressing.....	62	1	0	1	0
Mining.....	54	0	0	2	0
Petrography.....	262	1	0	1	0
Metallurgy.....	243	1	0	1	0

## THIRD YEAR—Cont.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Physical Metallurgy.....	244	0	0	2	0
Commercial Law.....	124	1	0	1	0
Petrography Laboratory ..	263	0	2	0	2
Introductory Research....	64	0	0	0	3
Chemical Laboratory .....	99	0	3	0	6
Mechanics of Materials Laboratory.....	9	0	0	0	3
Engineering Drawing.....	174	0	9	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Letters.....	66				
Thesis.....	65	0	7	0	10
Mine Cost Keeping and Management.....	56	1	0	1	0
Thermodynamics.....	223	1	0	1	0
Assaying.....	47, 48	0	0	1	3
Electrochemistry.....	107, 108	2	3	0	0
Geology, Pleistocene and Physiographic .....	194, 201	1	1	1	0
Geology, Precambrian.....	199	2	0	0	0
Geology, Mining.....	200	0	0	2	0
Metallurgy.....	247	1	0	1	6
Mining.....	55	1	0	1	0
Ore Dressing.....	60, 61	1	6	1	0
Business.....		1	0	1	0
Metallography.....	251	0	0	0	3
Power Electrical Lab'y... ..	144	0	3	0	0
Hydraulics Lab'y.. ..	210	0	0	0	3
Thermodynamics Lab'y.....	224	0	3	0	0

### 3. DEPARTMENT OF MECHANICAL ENGINEERING

The course in this Department is designed to meet the needs of those students who are intending to take up the work connected with Mechanical Engineering, such as the design of gas engines, steam engines, steam boilers, steam turbines, air compressors, etc.; the design and installation of the machinery connected with power plants and central stations, steam piping and other similar problems. The work is also so arranged that the student becomes somewhat familiar with the design of travelling cranes and mill buildings and similar problems connected with structural steel work.

Since the work of the mechanical engineer and of the electrical engineer is closely allied, the courses in these two departments in the first two years are practically identical and cover the subjects mentioned below.

In the third year the work becomes more specialized, the mechanical engineers paying more attention to heat engines of various types, and to mill building design and other work of similar nature. The study of electricity is continued and the student gets considerable practice in the mechanical and electrical laboratories.

In the fourth year the student devotes himself still more closely to his chosen work, placing the greater stress on thermodynamics and the theory and testing of heat engines, and problems in machine design and also in the design of hydraulic power plants with their accessories and pumps. Much time is spent in the mechanical laboratories testing gas and steam engines, water turbines and other hydraulic machinery.

Before receiving the degree in this department candidates are required to present satisfactory evidence of having had at least eight months' practical experience in one of the principal trades connected with Mechanical Engineering, the object being that graduates may have some practical knowledge of the duties of the workman in this branch of engineering, as distinguished from those of the purely technical man. Certificate forms will be furnished on application. These forms contain full details in regard to the work required and should be obtained by the candidate before he enters his employment.

## FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry....	238	1	0	2	0
Descriptive Geometry....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry..	85	2	0	1	0
Electricity.....	135	2	0	2	0
Illuminating Engineering	185	1	2	1	2
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing....	166	0	11	0	18
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Descriptive Geometry...	162	1	0	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials..	4	2	0	2	0
Engineering Chemistry..	93	1	0	0	0
Inorganic Chemistry A..	87A	1	0	0	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Hydrostatics.....	186	0	0	1	1½
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Steam Engines.....	216	1	0	1	0
Theory of Mechanism...	230	2	1½	2	1½
Economics and Finance..	123	1	0	1	0
Chemical Laboratory....	89	0	3	0	3
Engineering Drawing....	170	0	13	0	11
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Theory of Structures....	7	2	0	0	0
Thermodynamics.....	217, 219	2	3	2	3
Hydraulics.....	205, 206	2	0	2	3
Heat Engines.....	218	2	0	2	0
Mechanics of Machinery.	231	1	0	1	0
Machine Design.....	233	2	4	2	10
Magnetism Electricity..	138, 140	2	3	0	0
Alternating Current ....	139	1	0	1	3
Physical Metallurgy....	244	0	0	2	0
Compound Stress.....	10 (a)	1	0	0	0
Commercial Law.....	124	1	0	1	0
Mechanics of Materials Laboratory.....	9	0	0	0	3
Engineering Drawing....	177	0	9	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Engineering Economics..	125	0	0	1	0
Shop Managements and Costs.....	130	1	0	1	0
Structural Design.....	17	1	3	0	3
Mill Building Design....	18	1	0	0	0
Machine Design.....	234	1	5	1	5
Electrical Laboratory...	144	0	0	0	3
AND TWO OF:					
Thermodynamics....	220, 221, 222	3	9½	3	9
Hydraulics.....	207, 208, 209	3	9½	3	9
Mechanics of Materials including Structural Design Drawing....	12, 13, 15, } 17, 181 }	4	6	4	3
		0	4	0	6

#### 4. DEPARTMENT OF ARCHITECTURE

The instruction in this department is arranged to lay a broad foundation for the subsequent professional life of its graduates, and incidentally to prepare its students to be immediately useful in an architect's office. The curriculum has been arranged to meet the aesthetic and scientific needs of the profession, and includes History and Principles of Architecture, Freehand Drawing in pencil, ink and colour, Modelling, Architectural Design, Analysis and criticism of Buildings, Mathematics, Statics, Strength and Elasticity of Materials, Theory of Construction and Heating and Ventilation.

The equipment of the department includes a working library, current periodicals, photographs, lantern slides, and a large collection of Architectural models and casts.

#### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry....	238	1	0	2	0
Descriptive Geometry...	161	1	0	1	0
Statics.....	1	2	0	2	0
Building Measurements..	37	1	7	1	0
Elements of Architecture	28	1	0	1	0
History of Architecture..	25	1	3	1	0
Technical English.....	122	1	0	1	0
French.....	266	2	0	2	0
Modelling.....	36	0	2	0	2
Freehand Drawing.....	35	0	3	0	2
Architectural Drawing...	167	0	9	0	18
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	285				
Descriptive Geometry...	163	1	0	1	0
Mechanics of Materials..	5	2	0	2	0
Architectural Design....	31	1	0	1	0
History of Architecture..	26	1	0	1	0
History of Ornament....	29	1	0	1	0
Illumination.....	189	1	1½	1	1½
Economics and Finance..	123	1	0	1	0
Technical English .....		2	0	2	0
French.....	266	1	0	1	0
Modelling.....	36a	0	2	0	2
Freehand Drawing.....	35a	0	3	0	3
Architectural Design }	171	0	17	0	17
Architectural Drawing }		0	2	0	2
Physical Training.....					

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Structural Design.....	16	2	0	2	0
Acoustics .....	190	1	1½	1	0
Building Materials.....	38	2	0	2	0
History of Architecture..	27	1	0	1	0
History of Fine Art.....	30	1	0	1	0
Architectural Design....	32	1	0	1	0
Commercial Law.....	124	1	0	1	0
French.....	266	1	0	1	0
Modelling.....	36b	0	2	0	2
Water Colour Painting..	35b	0	3	0	3
Architectural Design }	175	0	18	0	18
Architectural Drawing }					

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	286	0	3	0	3
Contracts and Specifica- tions.....	127	0	0	1	0
Structural Design.....	16	1	3	1	3
Heating and Ventilating.....	40	1	0	1	0
Sanitary Science.....	39	1	0	1	0
Drawing from Life.....	35c	0	3	0	3
Modelling from Life.....	36c	0	2	0	2
AND ONE OF:					
Architectural Design..	33	2	24	2	22
Architectural Engineer- ing .....	34, 18	4	22	3	20

## 6. DEPARTMENT OF CHEMICAL ENGINEERING

In many industries there is a demand for a man who combines the technical knowledge of the mechanical engineer with a knowledge of chemistry. It is to fill this want that the course in Chemical Engineering is designed.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	0	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Optics.....	185	1	2	1	2
Technical English.....	122	1	0	1	0
German.....	267	1	0	1	0
Business.....	121	0	0	1	0
Mineralogy Laboratory.....	256	0	0	0	3
Biological Laboratory.....	80	0	3	0	3
Chemical Laboratory.....	86	0	10	0	10
Engineering Drawing.....	168	0	4	0	4
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	0	0
Organic Chemistry.....	96	2	0	2	0
Metallurgy.....	241	0	0	1	0
Hydrostatics.....	186	0	0	1	1
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Industrial Chemistry.....	94	1	0	1	0
Physical Chemistry.....	98	2	0	2	0
Inorganic Chemistry A.....	87A	1	0	0	0
Inorganic Chemistry B.....	87B	0	0	1	0
German.....	267	1	0	1	0
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	92	0	10	0	12
Engineering Drawing.....	172	0	7	0	3
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	7	2	0	0	0
Thermodynamics.....	217, 224	2	2	2	0
Hydraulics.....	205, 206	2	0	2	1
Metallurgy.....	243	1	0	1	0
Physical Metallurgy.....	244	0	0	2	0
Assaying.....	49	0	0	0	3
Analytical Chemistry.....	88	1	0	1	0
Electrochemistry.....	107, 108	2	3	0	0
Industrial Chemistry.....	103	1	0	1	0
Organic Chemistry.....	106	2	0	2	0
Chemical Plant.....	104	1	0	1	0
German.....	267	1	0	1	0
Commercial Law.....	124	1	0	1	0
Power.....	144, 224, 206	0	3	0	3
Chemical Laboratory.....	100	0	5	0	14
Engineering Drawing.....	177	0	6	0	0
Electrical Laboratory.....	144	0	3	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Shop Management and Costs.....	130	1	0	1	0
Machine Design.....	233	2	4½	0	0
German..... <i>or</i> Spanish.....	267 268	1 1	0 0	1 1	0 0
Inorganic Chemistry.....	109	2	0	2	0
Organic Chemistry.....	110	1	0	1	0
AND ONE OF:					
Electrochemistry.....	114, 115	2	*	2	*
Industrial Chemistry.....	112, 113	1	*	1	*
Sanitary and Forensic Chemistry and Bacteriology.....	116	1	*	2	*
Metallurgy.....	247	1	*	1	*
Zymology.....	283	*	*	*	*

\*All time not otherwise allotted must be spent in the various laboratories concerned in the proportions assigned by the Department.

## 7. DEPARTMENT OF ELECTRICAL ENGINEERING

The course in Electrical Engineering is arranged to provide preliminary training for those who would follow any of the various lines of activity connected with electrical industry.

The first two years of the course are devoted to fundamental scientific principles, and incidentally more or less of their application to engineering problems in mechanical, civil and electrical work. Many problems are solved in the drafting rooms by graphical methods. The third year includes further theoretical work, more particular attention being given to electrical and mechanical studies in theory, operation and design. The fourth year is devoted to advanced work in alternating current theory and practice combined with similar study in thermodynamics, hydraulics, electrochemistry or radiotelegraphy.

A large amount of laboratory practice is provided, most of which belongs to the third and fourth years. In this last year most of the time is spent in laboratory investigations and studies resulting therefrom.

Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in one of the principal trades connected with Electrical Engineering, the object being that graduates may have some practical knowledge of the technique of this branch of engineering. Certificate forms will be furnished on application. These forms contain full details in regard to the work required.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Illuminating Engineering..	185	1	2	1	2
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing.....	166	0	11	0	18
Physical Training.....		0	2	0	2

## SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Descriptive Geometry.....	162	1	0	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	0	0
Organic Chemistry.....	95	0	0	1	0
Inorganic Chemistry A.....	87A	1	0	0	0
Hydrostatics.....	186	0	0	1	1½
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Steam Engines.....	216	1	0	1	0
Theory of Mechanism.....	230	2	1½	2	1½
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	89	0	3	0	3
Engineering Drawing.....	166	0	12	0	12
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Thermodynamics.....	217, 219	2	2	2	1½
Hydraulics.....	206	2	0	2	1
Heat Engines.....	218	1	0	1	0
Mechanics of Machinery.	231	1	0	1	0
Machine Design.....	233	2	4½	2	4½
Alternating Current.....	139	1	0	2	0
Physical Metallurgy.....	244	0	0	2	0
Electrochemistry.....	107, 108	2	3	0	0
Magnetism and Electricity.....	138	2	0	1	0
Electrical Design.....	141, 142	1	3	1	3
Commercial Law.....	124	1	0	1	0
Electrical Laboratory....	140	0	6	0	6

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Engineering Economics..	125	0	0	1	0
Shop Management and Costs.....	130	1	0	1	0
Applied Electricity.....	145, 146	4	20	4	19
AND ONE OF:					
Hydraulics.....	207, 208, 209	3	9	3	10
Thermodynamics.....	220, 221, 222	3	9	3	9
Electrochemistry.....	114, 115	2	9	2	9
OR:					
Radiotelegraphy .....		2	9	2	9
and					
Acoustics.....	190	1	1	0	0

## 8. DEPARTMENT OF METALLURGICAL ENGINEERING

The object of this course is to provide instruction and preliminary training for those who intend to become Metallurgical Engineers. Candidates for the degree in this department will be required to present satisfactory evidence of having had at least eight months' experience in metallurgical work.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry..	85	2	0	1	0
Electricity.....	135	2	0	2	0
Technical English.....	122	1	0	1	0
Business.....	121	0	0	1	0
Mineralogy Laboratory..	256	0	0	0	3
Engineering Drawing....	166	0	11	0	14
Physical Training.....		0	2	0	2

### SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Dynamics.....	3	1	0	1	0
Mechanics of Materials..	4	2	0	2	0
Chemistry.....	87A, 87B, 88, 91	2	14	1	13
Metallurgy.....	241, 242	1	0	2	0
Geology and Ore Deposits.....	196	1	1	1	1
Steam Engines.....	216	0	0	1	0
Electricity.....	136, 137	2	3	2	3
Spanish.....	268	1	0	1	0
Economics and Finance..	123	1	0	1	0
Engineering Drawing....	172	0	3	0	6
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Cements and Concrete...	11	0	0	1	0
Heat Engines.....	218	1	0	1	0
Electricity.....	143, 144	1	3	1	3
Electrochemistry.....	107, 108	2	3	0	0
Assaying.....	45, 46	1	3	0	3
Ore Dressing.....	58, 59	1	3	1	3
Mining.....	51, 52	1	0	1	0
Metallurgy.....	245, 246	3	6	2	6
Machine Design.....	233	2	0	2	3
Commercial Law.....	124	1	0	1	0
Chemical Laboratory...	101	0	0	0	6
Engineering Drawing....	177	0	3	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	6	0	6
Engineering Economics..	125	0	0	1	0
Contracts and Specifica- tions.....	127	0	0	1	0
Plant Management.....	129	0	0	1	0
Thermodynamics.....	223	1	0	1	0
Assaying.....	47, 48	0	0	1	3
Ore Dressing.....	60, 61	1	6	1	0
Electrochemistry.....	114, 115	2	3	2	3
Metallurgy.....	249, 250	2	8	2	8
Metallurgy Problems... .	248	2	0	2	
Power	Thermodynamic Laboratory....	224	0	3	0
	Hydraulic Lab- oratory.....	210	0	0	3

## SCHOOL OF ENGINEERING RESEARCH

A School of Engineering Research, within the Faculty of Applied Science and Engineering was established in the Spring of 1917 at the suggestion of the late Dean Ellis.

The School is under the direct supervision of a Committee of Management composed of fifteen Members of the Faculty Council. To this Committee is entrusted the selection of researches to be undertaken under the auspices of the School, and the disposition of funds conducting them.

The School was organized chiefly for the training of graduates in methods of research, and for the carrying out of investigations. These latter may be problems relating to specific industries or raw materials and having a specific end in view, or general problems having to do with fundamental principles.

A number of research assistants are appointed annually in the various departments of the Faculty to carry on the work of research under direction of members of the staff. The facilities of the School are also open to graduates who desire to penetrate more deeply into particular phases of experimental work, or to undertake investigations either suggested by members of the staff or arising from their own work since graduation.

Address communications to the Secretary—Professor Maitland Boswell, Ph.D.

## RESEARCH FELLOWSHIP

Regulations applying to students proceeding to the Degree of M.A.Sc. as a Research Fellow or as an Instructor on the teaching staff of this Faculty.

(1) No person in receipt of a salary exceeding \$600.00 for seven months' work under the School of Engineering Research shall be permitted to proceed to the degree of M.A.Sc.

(2) A person in receipt of a salary not exceeding \$600.00 for seven months under the School of Engineering Research and proceeding to the degree of M.A.Sc. shall be known as a Research Fellow.

(3) A person in receipt of a salary not exceeding \$800.00 for seven months' work as Instructor on the teaching staff may be allowed half his time for research work, in order that he may proceed to the degree of M.A.Sc., which shall not be granted in less than two years to such a candidate.

## OUTLINE OF LECTURE AND LABORATORY COURSES PROCEEDING TO BACHELOR DEGREES

On the following pages the courses of instruction are set forth in detail. The time devoted to the various subjects, both for lectures and practical work, is indicated as accurately as possible.

The curriculum as printed is intended to cover the prescription for the current year only and does not imply the right of a student to have the course unchanged during any subsequent year.

The courses are designed to give the student a sound training in the fundamental scientific principles on which the various branches of engineering are based. The instruction is given by means of lectures and practical work in the laboratories, the drafting rooms and the field.

The courses in the first two years are devoted to the theoretical and essential scientific requirements of the engineering profession as a whole, with an introduction in a few cases of the practical application of these to engineering problems.

In the third and fourth years, the subjects of the former years are continued with particular attention paid to their application to modern engineering practice in the problems of design, erection, installation and operation peculiar to the several branches of the profession.

### APPLIED MECHANICS

#### 1. *Statics*:—T. R. Loudon.

All Departments, I. Year; 2 hours per week, both terms.

This course of lectures deals with forces in a single plane, and concerns chiefly the calculation of tension, compression and shearing stresses in frame structures and solid beams. It also deals with the consideration of problems relating to friction.

#### 2. *Dynamics*:—T. R. Loudon.

Departments 1, 2, 3, 6, 7, 8, I Year; 2 hours per week; both terms.

This course of lectures deals with bodies having motion of translation in one plane; also with relative motion, momentum, work and energy.

Text Book:—Tutorial Dynamics—Briggs and Bryan.

#### 3. *Dynamics of Rotation*:—W. J. Loudon.

Departments 1, 2, 3, 7, 8, II Year; 1 hour per week; both terms.

This course covers angular motion, including moments of inertia simple harmonic motion, the pendulum, centres of mass, suspension and percussion, the simple theory of the fly-wheel and the governor.

Text Book:—Dynamics of Rotation—Loudon.

4. *Mechanics of Materials:*—P. Gillespie.

Departments 1, 2, 3, 6, 7, 8, II Year; 2 hours per week; both terms. In this course the strength and elasticity of materials are mathematically treated. The stresses in such elements of structures as the tie rod, the beam, the strut and the member subjected to shear are investigated and the elementary principles of design established. In the lecture and drafting rooms through numerous problems involving the design of simple beams, columns, riveted connections, etc., these principles are exemplified. The work includes also the discussion of eccentric loading, suddenly applied loads and repeated stresses.

Reference Book:—*Mechanics of Materials*—Merriman.

5. *Mechanics of Materials:*—T. R. Loudon.

Department 4, II Year; 2 hours per week; both terms.

This course deals with the mathematical consideration of stress and elasticity. Among the problems taken up are the consideration of riveted joints, theory of simple and continuous beams, the theory of columns and simple column footings.

6. *Theory of Structures:*—C. R. Young.

Department 1, III Year; 2 hours per week; both terms.

The work of the first term comprises a thorough discussion of combined stresses, restrained, continuous and trussed beams, multiple beams and box girders, plate girders and certain practical aspects of column design. A number of designs of girders and structural details are worked out in the class and drafting rooms.

The second term is given chiefly to the design of a riveted truss highway span and a riveted truss railway span, the complete designs being made in the lecture and drafting rooms.

Text Books:—*Modern Framed Structures*, Part III—Johnson, Bryan and Turneaure; *Structural Problems*—Young; *Carnegie Pocket Companion*; *Cambria Steel*.

7. *Theory of Structures:*—C. R. Young.

Departments 2, 3, 6, III Year; 2 hours per week; first term.

The work is practically the same as that for Department I in the first term.

8. *Structural Design:*—T. R. Loudon.

Department 4, III Year; 2 hours per week; both terms.

During the first term, the economics of the design of floor systems in timber and structural steel are discussed. The design of masonry piers, structural steel and timber columns is also gone into in the first term.

The second term is taken up in the discussion of the design of roof trusses and plate girders.

9. *Mechanics of Materials*:—P. Gillespie.  
 Departments 1, 2, 3, III Year; 3 hours per week; one term.  
 This laboratory course is intended to give the student an introduction to the experimental study of the strength and elasticity of materials. It is intended that he shall acquire some familiarity with the construction and operation of testing machines and with the properties of the ordinary building materials.  
 Reference Book:—*Laboratory Instructions, Department of Applied Mechanics, U. of T.*, 1922.
10. *Stress Graphics*:—T. R. Loudon.  
 Department 1, III Year; one hour per week; both terms.  
 This course of lectures deals mainly with graphic methods of solving stresses in framed structures. The construction of Shearing Force diagrams, Bending Moment diagrams and Influence Lines is also dealt with.  
 Text Book:—*Graphic Analysis*—Wolfe.
- 10(a). *Compound Stress*:—T. R. Loudon.  
 Department 3, III Year; one hour per week, first term.  
 This course deals mainly with the discussion of methods determining the stress conditions in bodies subjected to compound stress. Both analytical and graphical methods of analysis are discussed.
11. *Cements and Concrete*:—P. Gillespie.  
 Departments, 1, 8, III Year; one hour per week; second term.  
 The manufacture, testing and use of Portland cement and the fundamentals of the theory of reinforced concrete are discussed in this course of lectures.
12. *Theory of Structures*:—C. R. Young.  
 Departments 1, 3, IV Year; 2 hours per week; both terms.  
 The work taken up in this course of lectures consists in swing bridges, arches, suspension bridges and some special features in column construction.  
 Reference Books:—*Modern Framed Structures*—Johnson; *Typical Steel Railway Bridges*—Thomson.
13. *Mechanics of Materials*:—P. Gillespie.  
 Departments 1, 3, IV Year; a laboratory course of 3 hours per week one term and 6 hours per week the other term.  
 This course of experiments is intended to give the student practice in investigating the elastic and physical properties of iron, steel, concrete, timber and other building materials.  
 Reference Book:—*Materials of Construction*—Johnson.

14. *Foundations, Retaining Walls and Dams*:—P. Gillespie, W. J. Smither.  
Department 1, IV Year; 1 hour per week; both terms.

This course of lectures is devoted to the design of the structures mentioned. Preparatory to the discussion of the practical aspects of the subjects, and in order to gain familiarity with the fundamental principles involved, a part of the first term is given over to the consideration of the theory of compound stress. The most approved forms of construction of retaining walls, footings, abutments, piers and dams are then described, and typical designs are worked out in the class and drafting rooms.

Some attention is given to the principles of formula charting.

Text Books and Books of Reference:—*Retaining Walls for Earth*—M. A. Howe; *Walls, Bins and Grain Elevators*—M. S. Ketchum; *A Treatise on Masonry Construction*—I. O. Baker; *Design and Construction of Dams*—E. Wegmann.

15. *Reinforced Concrete*:—P. Gillespie.

Department 1, IV Year; 1 hour per week; both terms.

The theory of the strength of reinforced concrete elements including the beam, the slab, the T-beam and the column, is continued in this course.

The analysis of the monolithic arch by the elastic theory is discussed, and the student is required in the drafting room to apply his knowledge to the design of simple structures.

Reference books:—*Principles of Reinforced Concrete Construction*—Turneaure and Maurer; *Reinforced Concrete Construction*, Vol. I—Hool.

16. *Structural Design*:—T. R. Loudon.

Department 4, IV Year; 1 hour per week; both terms.

During this course of lectures, the economics of the design of complete buildings in timber, reinforced concrete and steel are discussed.

This course of lectures is supplemented by the actual designing of buildings in the drafting room.

17. *Structural Design*:—C. R. Young, W. J. Smither.

Department 1<sub>c</sub>, 1<sub>d</sub>, IV Year; 1 hour per week; both terms.

Department 1<sub>b</sub> and 3, IV Year; 1 hour per week; first term.

This course of lectures is devoted to the problems connected with the structural design of buildings of timber, steel and reinforced concrete. The various structural elements such as the floors, columns, footings, walls and wind bracing, are fully discussed, and portions of typical buildings are designed in the class and drafting rooms.

Text Books:—*Handbook of Building Construction*—Hool and Johnson; *Architects' and Builders' Handbook*—Kidder—Nolan.

18. *Mill Building Design*:—C. R. Young, W. J. Smither.

Departments 1<sub>c</sub>, 1<sub>d</sub>, and 3, IV Year; 1 hour per week; first term.

Consideration is given in this course to the various types of mill buildings, to the conditions governing the choice and to the details of construction in different materials. Designs of portions of mill buildings are worked out in the class and drafting rooms.

Text Books:—Mill Buildings—Tyrrell; Steel Mill Buildings—Ketchum.

19. *Miscellaneous Structures*:—W. J. Smither.

Department 1, IV Year; 1 hour per week; second term.

In this course of lectures the application of theoretical principles to the design of a variety of structures is made. Among those structures discussed are transmission line towers, elevated tanks and their supporting towers, standpipes, large pressure pipes, sewers, culverts, small highway bridges, sub-surface tanks and tall chimneys. Whenever possible the lecture work is followed up by designs in the drafting room.

20. *Railway Structures*:—C. R. Young.

Department 1<sub>e</sub>, IV Year; 1 hour per week; first term.

A course of lectures with exercises covering alternative bridge layouts with comparative estimates of costs; temporary and permanent trestles; tunnels; tunnels vs. bridges; buildings; snow sheds and shelters.

## ARCHITECTURE

25. *History of Architecture*:—H. H. Madill.

Department 4, I Year; 1 hour per week; both terms.

In this course the development of architecture is treated very briefly and in an elementary manner, from the Pyramids of Egypt to the present day.

26. *History of Architecture*:—

Department 4, II Year; 1 hour per week; both terms.

The Antique, Renaissance and the Modern styles are dealt with more fully than is possible in the elementary history.

27. *History of Architecture*:—A. W. McConnell.

Department 4, III Year; 1 hour per week; both terms.

In this course the work of the previous year is continued, with special attention given to the development of buildings in planning and detail.

28. *Elements of Architecture*:—H. H. Madill.

Department 4, I Year; 1 hour per week; both terms.

Lectures on the Five Orders of Architecture, their affiliated forms and the other elements used in design. Simple problems in elementary design involving the use of the orders and other elements are set from time to time.

29. *History of Ornament*:—H. H. Madill.

Department 4, II Year; 1 hour per week; both terms.

In this course the development of Ornament is traced from the beginning through Egyptian, Assyrian, Grecian, Roman, Byzantine, Romanesque, Gothic and Renaissance styles. An attempt is made to analyze ornament of the best periods and to systematize the principles followed in form and colour. The development and types of mouldings are also studied.

30. *History of Fine Art*:—C. W. Jefferys, Frederick Coates.

Department 4, III Year; 1 hour per week; both terms.

In the first term the course consists of an outline of the history and development of painting and of the minor pictorial arts from the earliest time until the present day.

In the second term an outline of the history and development of the different eras of sculpture ranging from the primitive to the present day, is given.

31. *Architectural Design*:—A. W. McConnell.

Department 4, II Year; 1 hour per week; both terms.

This course is given by means of individual instruction in the classroom by criticisms of the solutions of different problems set during the year and by a series of lectures. It is in this course that the student begins the serious study of design; continued practice in architectural drawing and rendering affords the training necessary to make the student a proficient draughtsman.

32. *Architectural Design*:—A. W. McConnell.

Department 4, III Year.

Theory and practice of Design.

This course is given by individual instruction in the studio and by lectures. The greater part of the course is devoted to problems in design, and forms a continuation of the course given in the preceding year.

33. *Architectural Design*:—A. W. McConnell.

Department 4, IV Year.

The entire course is devoted to advanced academic training in designing the more monumental classes of buildings.

34. *Architectural Design*:—A. W. McConnell.

Department 4, IV Year; Architectural Engineering Option.

A short course of lectures and studio work referring especially to the artistic side of the design of commercial buildings.

35. *Freehand Drawing and Water Colour Painting*:—C. W. Jefferys.

Department 4, I Year; 3 hours per week; both terms.

Drawing from still life objects. Primary free hand perspective. Primary pencil, charcoal, and pen and ink rendering.

- 35a. Department 4, II Year; 3 hours per week; both terms.  
 Drawing and monochrome painting from still life.  
 Drawing from the cast.  
 Pencil, pen and ink, and monochrome rendering.  
 Primary water colour.  
 Drawing from landscape and natural objects.
- 35b. Department 4, III Year; 3 hours per week; both terms.  
 Drawing from the cast.  
 Water colour from still life. Water colour rendering.  
 Drawing from landscape and natural objects.  
 Students who are sufficiently advanced are admitted to the **Fourth Year Life Drawing Class.**
- 35c. Department 4, IV Year; 3 hours per week; both terms.  
 Water colour from still life and from landscape.  
 Drawing from life.  
 Water colour rendering.
36. *Modelling*:—Frederick Coates.  
 Department 4, I Year; 2 hours per week; both terms.  
 The Orders. Synopsis of styles.
- 36a. Department 4, II Year; 2 hours per week; both terms.  
 Problems in figures and in relation to architecture.
- 36b. Department 4, III Year; 2 hours per week; both terms.  
 Styles continued.  
 Problems, combination of figure, ornament and architecture and their relative values.
- 36c. Department 4, IV Year; 2 hours per week; both terms.  
 Modelling from life.  
 Anatomy.  
 Composition of groups.
37. *Building Measurement*:—C. H. C. Wright.  
 Department 4, 1 Year; 1 hour per week; both terms.  
 In this course of lectures the principles of measurements and mensuration with special reference to buildings will be discussed. With this is combined practice in measurements of existing buildings, quantities, etc.
38. *Building Materials*:—C. H. C. Wright.  
 Department 4, III Year; 2 hours per week; both terms.  
 The structural and aesthetic value of the various building materials.
39. *Sanitary Science*:—H. H. Madill.  
 Department 4, IV Year; 1 hour per week; both terms.  
 Modern plumbing, its design and installation, drainage, sewerage disposal and water supply.
40. *Heating and Ventilating*:—C. H. C. Wright.  
 Department 4, IV Year; 1 hour per week; both terms.  
 The design of different systems, where they should be used, heating specifications, etc.

### ASSAYING, MINING AND ORE DRESSING

The work in Mining is directed more to the development of the proper attitude of mind towards mining problems than to the teaching of actual mining methods.

The teaching of Assaying has a two-fold function. The first is to give the student a working knowledge of the practice of the art, so that he can earn money as an assayer on graduation and use this as a stepping-stone to other positions. The second is to use the assaying laboratories for the training of the students in certain important phases of Engineering methods. The size of the apparatus, the completeness of the processes in short intervals of time, the extreme accuracy of results when so desired, the relation of the extent of error to time and method, the similarity of the academic laboratory to the field laboratory, all these permit an unrivalled opportunity for driving home much broad Engineering philosophy. The assaying processes and apparatus lend themselves peculiarly well for the development of a proper perspective in regard to errors and accuracy in measurements.

The study of Ore Dressing, when accompanied by laboratory work in a well equipped ore dressing laboratory, is one of the most important of the Mining Engineering subjects. Not only is the mechanical treatment of ores a very important branch of Mining Engineering, but the mental processes involved in a study of the fundamental principles underlying the art and the compromise necessary for field practice form one of the best fields for the development of Engineering philosophy. From these points of view the ore dressing laboratory is exceptionally well equipped.

#### 45. *Assaying*:—J. T. King.

Departments 2-8, III Year; 1 hour per week; first term.

A first course of lectures on the theory of fire assaying. Emphasis is laid not only on the chemical and metallurgical principles involved, but upon the errors inherent in operators as well as in methods.

Text Book—"Fulton" Manual of Fire Assaying.

#### 46. *Assaying*:—J. T. King.

Departments 2-8, III Year; 3 hours per week; both terms.

A laboratory course in the determination of the precious metals in ores, milling and metallurgical products. Scorification and crucible assays of ores and products, pure and impure, fluxes, slags and solutions. Buckboard practice, ores with metallics. Copper and lead by electrolysis. Students are expected to do their later assays with despatch and a reasonable degree of accuracy. Neatness of work is required.

47. *Assaying*:—J. T. King.  
Departments 2-8, IV Year; 1 hour lecture per week; second term.  
A continuation of course 45. Complex ores. Combination assays.  
The sampling and assay of bullion. The Platinum group metals.  
Checks and corrections.
48. *Assaying*:—J. T. King.  
Departments 2-8, IV Year; 3 hours per week; second term.  
An advanced laboratory course in which some of the methods of  
course 47 are used.
49. *Assaying*:—J. T. King.  
Department 6, III Year; 3 hours per week; one term.  
An introductory laboratory course for Chemical Engineers. Some  
lecture instruction is given. An abbreviation of courses 45  
and 46.
50. *Mining*:—H. E. T. Haultain and F. C. Dyer.  
Department 2, I Year; 3 hours per week; second term.  
A laboratory course, including some lectures, being an introduction  
to certain mining and milling machinery and methods.
51. *Mining*:—H. E. T. Haultain.  
Department 2, II Year and Department 8, III Year; 1 hour per  
week; first term.  
An introductory course of lectures.
52. *Mining*:—H. E. T. Haultain.  
Department 8, III Year; 1 hour per week; second term.  
An extension of No. 51.
53. *Mining*:—F. C. Dyer.  
Department 2, II Year; 3 hours per week; one term.  
Continuation of No. 50. Rock drills, sampling methods, use of  
explosives.
54. *Mining*:—H. E. T. Haultain and F. C. Dyer.  
Department 2, III Year; 2 hours per week; second term.  
Principles of mining.
55. *Mining*:—H. E. T. Haultain.  
Department 2, IV Year; 1 hour per week; both terms.  
Special problems, estimates, reports.
56. *Mine Cost Keeping and Management*:—H. E. T. Haultain.  
Department 2, IV Year; 1 hour per week; both terms.  
One of the fundamental features that must not be lost sight of by  
the Mining Engineer is, that his work is designed primarily for  
purposes of financial profit. This course of lectures deals with

details from this point of view. The total cost of a ton of ore requiring as it does an understanding of the problems of amortization, is first dealt with in a broad way. Then are considered various problems of cost keeping, leading on to problems of time and motion study which are essential to the development of the fine points of the art in any particular mining problem. The latter part of the course deals with problems of management, the relations of members of the staff to each other, and the relations of the staff to labour.

**57. *Ore Dressing:*—H. E. T. Haultain.**

Department 2, II Year; 1 hour per week; first term.

An introduction to the study of Ore dressing.

**58. *Ore Dressing:*—H. E. T. Haultain and F. C. Dyer.**

Departments 2 and 8, III Year; 1 hour per week; both terms.

The general principles of Ore dressing.

**59. *Ore Dressing:*—F. C. Dyer.**

Departments 2 and 8, III Year; 3 hours per week; both terms.

Work with crushing machinery, principles of crushing and grading screen analyses, concentration with gravity separation apparatus, etc.

**60. *Ore Dressing:*—H. E. T. Haultain and F. C. Dyer.**

Departments 2 and 8, IV Year; 1 hour per week; both terms.

No. 58 continued, study of flow sheets and special problems.

**61. *Ore Dressing:*—F. C. Dyer.**

Departments 2 and 8, IV Year; 6 hours per week; one term.

Advanced work with ore dressing appliances, ore testing and check mill runs.

**62. *Physics of Ore Dressing:*—H. E. T. Haultain and F. C. Dyer.**

Department 2, III Year; 1 hour per week; both terms.

Ore dressing methods involve a study of the laws governing the phenomena of surface tension, capillarity and colloidal solutions, in addition to those of hydrostatics and certain phases of hydraulics. This is embodied in a special course of lectures in conjunction with laboratory work in the Ore dressing laboratory.

**63. *Theory of Measurement:*—H. E. T. Haultain.**

Department 2, II Year; 1 hour per week; one term.

This title is not an entirely suitable one for this course of lectures because it is generally applied to a study of the philosophy of extremely accurate measurements. The Mining Engineer ~~ne~~ continually make satisfactory use of measurements with a wide range of inaccuracy. This course of lectures deals with the

philosophy underlying the causes of these errors and the practical application of such approximations. The opportunity is taken in these lectures to deal with the subject of illustrating measurements by graphs.

**64. *Introductory Research*:**—H. E. T. Haultain and F. C. Dyer.

Department 2, III Year; 3 hours per week; second term.

This is a laboratory course including some lectures and is a preparation for the thesis of the fourth year.

**65. *Thesis*.**

Department 2, IV Year; 7 hours per week; first term; 10 hours per week, second term.

Thesis in this department consists mainly in reports on original work done in the laboratories. In the III year the subject "Introductory Research" paves the way for the thesis. During the month of October the student decides on the subject of his thesis in consultation with his professors. After this is decided the student uses his own initiative in the development of his work.

The thesis is divided into three parts. The first part, which is handed in during the first week in November, contains the title, a statement of what the title is meant to convey and an outline of the work that is proposed to be done. The second part is handed in during the first week of January and contains a report of progress to date and enables the professor in charge to keep in closer touch with the work. The third and final part is handed in a week before the examinations and is a report of progress to date with final conclusions. The three parts combined constitute the thesis.

**66. *Vacation Letters*.**

Department 2, III Year and IV Year.

These are a series of letters written during the summer vacation, dealing with various aspects of a mining engineer's work. They are intended to direct and help the student's powers of observation, analysis and criticism as well as being exercises in the art of lucid technical expression. See page 20 for instructions.

**67. *Vacation Work*.**

Department 2, II Year.

See page 20 for detailed instructions.

## ASTRONOMY AND GEODESY

**71. *Astronomy, Elementary:***—C. A. Chant.

Department 1, II Year; 1 hour per week, both terms.

A course in descriptive Astronomy, explaining the ordinary astronomical terms, and describing the various celestial bodies and their motions. In the evenings opportunity will be given for identifying the stars and for observing with telescopes.

Text book:—*Manual of Astronomy*—C. A. Young.

**72. *Astronomy and Geodesy:***—L. B. Stewart.

Department 1, III Year; 2 hours per week.

The course of lectures deals with the determination of time, latitude, longitude and azimuth, by methods adapted to the use of the surveyor's transit and the sextant. It is designed to fulfil the requirements of the final examinations for Ontario and Dominion Land Surveyors.

In Geodesy an account is given of the principles and methods of a secondary triangulation survey, also of the principles involved in the North-West system of survey.

Text books:—*Practical Astronomy as applied to Geodesy and Navigation*—Doolittle; *Nautical Almanac*, 1924.

**73. *Field Work:***—L. B. Stewart, S. R. Crerar.

Department 1, III Year; about 2 hours per week, first term.

The practical work in this subject comprises observations in the field with the transit and sextant for the determination of time, latitude and azimuth by the methods described in the lectures.

**74. *Astronomy (Advanced):***—L. B. Stewart.

Department 1, IV Year; 2 hours per week.

The lecture course in this subject comprises the theory and adjustment of the instruments used in connection with a geodetic survey; the methods of taking and reducing observations for time, longitude, latitude, and azimuth, with the precision required on such a survey; and other matters relating to these subjects.

**75. *Geodesy and Metrology:***—L. B. Stewart.

Department 1, IV Year; 2 hours per week.

The lecture course includes a description of the methods of measuring base lines and the angles of a triangulation; the geometry of the spheroid with applications to geodetic problems; the computation of geodetic positions; the solution of large triangles on the earth's surface, and the adjustment of a triangulation; trigonometric and precise spirit levelling; the determination of the figure of the earth by arc measurements, and by the pendulum; the theory of map projections, etc.

76. *Astronomy, Geodesy and Metrology*:—L. B. Stewart.

Department 1, IV Year; about 23 hours per week.

The practical work in the above subjects includes the observation of meridian transits for time and longitude determinations, and of prime vertical transits for latitude, with the astronomical transit instrument; the observation of meridian zenith distances of stars, and of azimuths at elongation for latitude, with the alt-azimuth; theodolite observations for azimuth; observations for latitude with the zenith telescope; the investigation of the constants of the instruments used, and the reduction of all observations; the measurement of a base line with the steel tape and with invar wires, and the determination of the constants of the tape; the measurement of the angles of a triangulation and the adjustment of the angles of network of triangles, etc.

## BIOLOGY

80. *Elementary Biology*:—J. H. Faull.

Department 6, I Year; 3 hours per week, each term.

An elementary laboratory course on the nature and identification of plant and animal tissues and products, with microscope practice.

81. *Elementary Biology*:—E. M. Walker.

Department 1<sub>b</sub>, IV Year.

A special Course of Laboratory work and demonstrations in General Biology, five hours per week, first term.

82. *Hygiene and Bacteriology*:—J. G. Fitzgerald, R. D. Defries.

Departments 1<sub>b</sub> and 6, IV Year.

- (1) This is a course of twenty-five lectures, dealing with the principles of Hygiene and Sanitary Science and including a discussion of the facts in Bacteriology which are necessary for a proper understanding of Hygiene and Sanitary Science. The particular phases of the subject which are of importance from the standpoint of Sanitary Engineering are dealt with.
- (2) This is a laboratory course of six hours per week, second term, dealing especially with the Bacteriology of water, milk and sewage.

## CHEMISTRY

85. *Elementary Chemistry*:—E. G. R. Ardagh.

All Departments, I Year; 2 hours per week, first term; 1 hour per week, second term.

A lecture course in elementary chemistry dealing with the metals and non-metals, with experimental illustrations.

86. *Inorganic Chemistry*:—L. J. Rogers.

Department 6, I Year; 10 hours per week, both terms.

A laboratory course of quantitative experiments illustrating the use of the sensitive balance, and confirming the fundamental laws of chemistry; qualitative inorganic analysis; quantitative analysis of pure salts; inorganic preparations; molar weight determinations.

Text books:—Analytical Chemistry, Vol. II—Treadwell Hall; Qualitative Chemical Analysis—A. A. Noyes.

87A. *Inorganic Chemistry A*:—E. G. R. Ardagh.

Departments 1, 2, 3, 6, 7 and 8, II Year; 1 hour per week, first term.  
A continuation of Course 85.

87B. *Inorganic Chemistry B*:—E. G. R. Ardagh.

Departments 2, 6 and 8, II Year; 1 hour per week, second term.  
A lecture course on the chemistry of the metals; a continuation of Course 85.

88. *Analytical Chemistry*:—L. J. Rogers.

Departments 2, 6 and 8, III Year; 1 hour per week, both terms.

A lecture course on the principles of chemical analysis; select gravimetric and volumetric methods; technical analysis.

89. *Analytical Chemistry*:—E. G. R. Ardagh.

Departments 1, 2, 3 and 7, II Year; 3 hours per week.

Laboratory practice in elementary qualitative and quantitative analysis.

Text book:—A Smaller Chemical Analysis—Newth.

90. *Analytical Chemistry*:—J. W. Bain.

Department 2, II Year; 3 hours per week, both terms.

A laboratory course in the gravimetric determination of metals and acids, with elementary volumetric analysis.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

91. *Analytical Chemistry*:—L. J. Rogers.

Department 8, II Year; about 12 hours per week.

A laboratory course comprising gravimetric and volumetric methods, acidimetry and alkalimetry.

Text books:—Analytical Chemistry, Vol. II—Treadwell Hall, Qualitative Chemical Analysis—A. A. Noyes.

92. *Analytical Chemistry*:—L. J. Rogers.

Department 6, II Year; 180 hours.

A laboratory course in quantitative chemical analysis; inorganic preparations.

Text book:—Analytical Chemistry, Vol. II—Treadwell Hall.

**93. *Engineering Chemistry:***—J. W. Bain.

Departments 1, 3, 6 and 7, II Year; 1 hour per week, first term.

A lecture course consisting of a study of the industrial production and application of heat and light, and of the chemistry of fuel and the products of combustion.

**94. *Industrial Chemistry:***—J. W. Bain.

Department 6, II Year; 1 hour per week, both terms.

A lecture course on the manufacture of salts, acids, alkalies and inorganic chemicals.

**95. *Organic Chemistry:***—M. C. Boswell.

Departments 1, 2, 3 and 7, II Year; 1 hour per week, second term.

A lecture course in elementary organic chemistry.

**96. *Organic Chemistry:***—M. C. Boswell.

Department 6, II Year; 2 hours per week, both terms.

A lecture course dealing with the aliphatic compounds.

**97. *Organic Chemistry:***—M. C. Boswell.

Department 6, II Year; 60 hours.

A laboratory course in organic preparations.

**98. *Physical Chemistry:***—F. B. Kenrick.

Departments 6, II Year; 2 hours per week, both terms.

A course of lectures on the elements of chemical mechanics, and the theory of solutions.

**99. *Analytical Chemistry:***—E. G. R. Ardagh.

Department 2, III Year; 3 hours per week, first term; 6 hours per week, second term.

A laboratory course on the technical analysis of ores and furnace products.

**100. *Industrial Chemistry:***—E. G. R. Ardagh.

Department 6, III Year; about 10 hours per week.

A laboratory course in industrial chemistry.

**101. *Analytical Chemistry and Phase Rule:***—L. J. Rogers, J. T. Burt-Gerrans.

Department 8, III Year; about 6 hours per week.

A laboratory course in analysis and phase rule.

**102. *Engineering Chemistry:***—J. W. Bain, E. G. R. Ardagh.

Departments 1, 2, 3, 6, 7 and 8, III Year; 1 hour per week, both terms.

A lecture course on the application of chemistry to engineering problems; air, water, sewage, the materials of construction, explosives, etc.

103. *Industrial Chemistry*:—E. G. R. Ardagh.  
Department 6, III Year; 1 hour per week, both terms.  
A lecture course on petroleum and its products, coal tar and its products; fats, oils, soap, sugar, starch, and gums; fermentation industries, etc.
104. *Chemical Plant*:—J. W. Bain.  
Department 6, III Year; 1 hour per week, both terms.  
A lecture course on the machinery and plant used in chemical manufacturing.
105. *Organic Chemistry*:—M. C. Boswell.  
Department 6, III Year; 2 hours per week, both terms.  
A lecture course on the aromatic series.
106. *Organic Chemistry*:—M. C. Boswell.  
Department 6, III Year; 85 hours.  
A laboratory course in organic preparations in the aromatic series.
107. *Electrochemistry*:—W. L. Miller.  
Departments 6, 7 and 8, III Year; Department 2, IV Year; 2 hours per week, first term.  
A lecture course on elementary electrochemistry, illustrated by experiments.
108. *Electrochemistry*:—W. L. Miller and J. T. Burt-Gerrans.  
Departments 6, 7 and 8, III Year; 3 hours per week, first term.  
Department 2, IV Year.  
A laboratory course in quantitative measurements to accompany Course 101.
109. *Inorganic Chemistry*:—J. W. Bain.  
Department 6, IV Year; 2 hours per week, both terms.  
A lecture course on chemical theory.
110. *Organic Chemistry*:—M. C. Boswell.  
Department 6, IV Year; 1 hour per week, both terms.  
A lecture course on advanced organic chemistry.
111. *Organic Chemistry*:—M. C. Boswell.  
Department 6, IV Year.  
A laboratory course in advanced organic chemistry.
112. *Industrial Chemistry*:—J. W. Bain.  
Department 6, IV Year; 1 hour per week, both terms.  
A lecture course on selected subjects in chemical technology.
113. *Industrial Chemistry*:—J. W. Bain, E. G. R. Ardagh, M. C. Boswell.  
Department 6, IV Year.  
A laboratory course in industrial problems.

**114. *Electrochemistry:***—J. T. Burt-Gerrans.

Department 6, 7 and 8, IV Year; 2 hours per week, both terms.

An advanced lecture course on the theory of solutions and electrolysis, and the application to the practice of electro-deposition and electrolytic refining of metals. The course also includes lectures on the electric furnace with special consideration of efficiency.

Text books:—Electrometallurgy—Borchers; Electrochemistry—Le Blanc; Electrochemistry—Luepke.

**115. *Electrochemistry:***—W. L. Miller and J. T. Burt-Gerrans.

Departments 6, 7 and 8, IV Year.

A laboratory course accompanying Course 114.

**116. *Sanitary and Forensic Chemistry:***—J. W. Bain.

Department 6, IV Year; 1 hour per week, both terms.

A lecture course on the composition and examination of air, water and food; poisons and their detection, with accompanying laboratory course.

**117. *Sanitary Chemistry:***—E. G. R. Ardagh.

Department 1<sub>b</sub>, IV Year.

A lecture and laboratory course on water supply, sewerage disposal ventilation, etc.

## ECONOMICS AND BUSINESS ADMINISTRATION

**121. *Business:***—

Departments 1, 2, 3, 6, 7, 8, I Year; 1 hour per week, second term.

A lecture course on the principles underlying accounting and general business methods of a simple nature in order to enable the student to understand simple financial reports.

**122. *Technical English:***—S. G. Bennett.

All Departments, I Year; 1 hour per week, both terms.

A lecture course on the expression of ideas and the compilation and writing of different types of engineering reports; technical exposition; the derivation and use of technical terms; the necessity of accurate expression in professional writing; terminology; the use of graphic methods for presenting facts; abbreviations; numbers; symbols.

**123. *Economics and Finance:***—C. R. Fay.

All Departments, II Year; 1 hour per week, both terms.

An introduction to the study of Economics. The course will deal in an elementary fashion with the following:

- (1) Scope and Method of Economics.
- (2) Theory of Value and Distribution.
- (3) Structure of Industry and Social Conditions.
- (4) Money, Banking and Public Finance.

Text Book:—Economics for the General Reader—Clay.

124. *Commercial Law*:—A. R. Clute.

All departments, III Year; 1 hour per week, both terms. General Principles of the Law of Contracts, Principal and Agent, Partnership and Limited Companies (with special reference to the Companies Acts). General view of the following:—Negotiable Instruments, Sale of Goods, Bills of Sale and Chattel Mortgages, Suretyship and Guarantee.

Text-Book:—Stephens' Elements of Mercantile Law (5th Ed., 1911.)

125. *Engineering Economics*:—C. R. Young.

Departments 1, 3, 7, 8, IV Year; 1 hour per week, second term.

A series of lectures on the principles by which the economic practicability of a project is judged and the comparison of competing proposals is made. Consideration is given to first cost and annual cost, methods of estimating, fixed charges and operating expenses, valuation and appraisals. Special attention is given to depreciation and the methods of providing for it, as well as to its relation to amortization. Typical numerical problems are discussed and solved.

Text Books:—Engineering Economics—Fish; Financial Engineering —Goldman.

126. *Engineering Law*:—

Department 1, IV Year; 1 hour per week, first term.

A course of lectures, co-ordinating Engineering practice and Law as contained in various legislation such as: The Railway Act, Municipal Act, Public Health Act, Arbitration Act, Workmen's Compensation Act, Patents, Copyrights, etc.

127. *Contracts and Specifications*:—C. R. Young.

Departments 1, 4, 8, IV Year; 1 hour per week, second term.

This course of lectures deals with the fundamental principles of contract and specification writing. The critical examination of typical specifications and agreements by the class, forms an essential feature of the instruction.

Text Books:—Engineering Contracts and Specifications—Johnson; Elements of Specification Writing—Kirby.

128. *Management*:—C. R. Young.

Department 1, IV Year; 1 hour per week, first term.

A series of lectures dealing with the fundamental principles upon which management is based. The possibilities of effective management are indicated and its basis is shown to exist in suitable organization, adequate equipment and smooth administration. Consideration is given to such matters as selection of personnel, essentials of effective organization for enterprises of widely different character and the art of directing a force so as to attain a desired end in an expeditious and effective manner.

**Text Books:**—Construction Cost Keeping and Management—Gillette and Dana; Principles of Industrial Organization—Kimball; Administration of Industrial Enterprises—Jones.

129. *Plant Management:*—G. A. Guess.

Department 8, IV Year; 1 hour per week, first term.

A course of twelve lectures dealing with some phases of labour, plant organization, smelter contracts and markets.

130. *Shop Management and Costs:*—E. A. Allcut and H. W. Price.

Departments 3, 6, and 7, IV Year; 1 hour per week, both terms.

131. *Railway Economics:*—W. M. Treadgold.

Department 1, Option e, IV Year; 2 hours per week, both terms.

The object of this course is to make the student acquainted with the general principle of railroad engineering and the following branches of the subject will be discussed—economic theory of location, train resistance, effect of grade, distance and curvature, rise and fall, maintenance of way, yards and terminals, tunnels and street railway practice.

132. *Municipal Administration:*—P. Gillespie, A. T. Laing.

Department 1, Option b, IV Year; 1 hour per week, both terms.

A course of lectures dealing with civics, local improvement laws and assessments, building codes, fire control, transportation, public utilities, etc.

133. *Public Speaking:*—

Department 1, III Year; 1 hour per week, first term.

A course on the principles of public speaking and the means of expression accompanied by practical application and training in actual speaking.

## ELECTRICITY

135. *Electricity:*—H. W. Price.

Departments 1, 2, 3, 6, 7 and 8, I Year; 2 hours per week, both terms.

A course of lectures on basic principles relating to electric circuits, magnetic circuits, instruments and apparatus in general, distribution of electrical energy, etc., illustrated largely from commercial apparatus. The point of view of this work is quantitative rather than descriptive, for it is believed that men who can solve engineering problems are most likely to grasp underlying principles.

136. *Electricity:*—W. S. Guest.

Departments 3, 6, 7 and 8, II Year; 2 hours per week, both terms.

Deals with the theory of electrical measurements, and detailed study of various methods applicable under different conditions in engi-

neering practice to the measurement of resistance, current, potential difference, power and energy; calibration of commercial measuring instruments. The effect of choice of conditions of measurement on the accuracy of the result is considered.

**137. Electrical Laboratory:**—W. S. Guest.

Departments 3, 6, 7 and 8, II Year; 3 hours per week, both terms.

This laboratory course is closely associated with the lecture course 136 on electricity for the second year. The more important and useful methods of testing generators and circuits for electromotive force, resistance, current, grounds, etc., are practiced, often under conditions such as occur in practice. The work also includes methods of calibration of measuring instruments for voltage, current, power and energy, and certain studies of properties of incandescent lamps.

**138. Magnetism and Electricity:**—A. R. Zimmer.

Department 3, III Year; 2 hours per week, first term.

Department 7, III Year; 2 hours per week, first term; 1 hour per week, second term.

A course of lectures on theory of magnetism and magnetic circuits, theory of direct-current generators, motors, etc.

**139. Alternating Current:**—A. R. Zimmer.

Departments 3 and 7, III Year; 1 hour per week, first term; 2 hours per week, second term.

A first course of lectures on alternating current, covering principles of measurement and leading to the analytical and graphical treatment of the simpler problems relative to alternating-current circuits and machinery.

**140. Electrical Laboratory:**—A. R. Zimmer.

Department 3, III Year; 3 hours per week; Department 7, III Year; 6 hours per week.

This laboratory course is intended to afford the student an opportunity to become familiar with principles involved in continuous-current shunt, series and compound-wound generators and motors, and, to some extent, alternating-current circuits and machinery. Other sections of the work deal with the magnetic properties of iron and steel, and study of iron losses in transformers and generators.

The course is arranged to stand in close relation to the lecture courses in the subjects of magnetism and electricity and alternating current (138, 139) for III Year, and to certain design work (141).

**141. Electrical Design:**—H. W. Price.

Department 7, III Year; 1 hour per week.

A course of lectures dealing with design of electrical apparatus and machinery, accompanied by designs to be worked out in the design room.

142. *Electrical Design*:—H. W. Price.

Department 7, III Year; 3 hours per week

A design room is set apart for working out designs of electrical apparatus such as transformers, generators, motors, auxiliary apparatus, etc.

Special forms and notes are employed, arranged to suit the various studies. Certain models are provided to assist where necessary.

143. *Electricity*:—H. W. Price.

Departments 1, 2 and 8, III Year; 1 hour per week, both terms.

A continuation of Course 135, First Year, adapted to the requirements of non-electrical students. It deals with problems on direct-current circuits and apparatus; magnetic circuits; power measurements; alternating current principles and machinery; transmission; power-plants, etc.

144. *Electrical Laboratory*:—H. W. Price, A. R. Zimmer.

(a) Department 1.

III Year; 3 hours per week, first term.

IV Year; Options d and e, 3 hours per week, second term.

(b) Department 2.

IV Year; 3 hours per week, first term.

(c) Department 3.

IV Year; 3 hours per week, second term.

(d) Department 6.

III Year; 3 hours per week, first term.

(e) Department 8.

III Year; 3 hours per week, both terms.

These courses are arranged to suit the requirements of the departments concerned. The experiments are planned with the idea of affording a general knowledge of circuits, power measurements, direct-current and alternating current machinery and transmission of power.

145. *Applied Electricity*:—T. R. Rosebrugh and H. W. Price.

Department 7, IV Year; 4 hours per week.

This course deals by analytical and vector methods with the theory of alternating-current circuits and machinery. Applications of theory are considered with regard to transformers, single and polyphase generators, synchronous motors and rotary converters, induction and commutating series motors, transmission lines, wave analysis, etc.

146. *Electrical Laboratory*:—A. R. Zimmer.

Department 7, IV Year, in connection with 145; 20 hours per week.

This laboratory course involves a thorough study of principles and properties of single and polyphase circuits and apparatus. Both vector and analytical methods are applied to the solution of problems based on tests made on laboratory machines.

The work deals mainly with constant-voltage and constant-current transformers, single and polyphase alternators, synchronous motors, rotary converters, induction and single phase commutating motors, transmission line, etc. The work does not consist only of factory tests, but is designed to lead the student to apply theory to practice as illustrated in the apparatus under test, with a view to an exact understanding of methods and an appreciation of limitations under many conditions. Free use is made of the oscillograph as a necessary device for "seeing" conditions under investigation. The best commercial measuring instruments are available.

## ENGINEERING DRAWING AND DESCRIPTIVE GEOMETRY

### 160. *Descriptive Geometry*:—J. R. Cockburn.

Departments 1, 2, 3, 6, 7 and 8, I Year; 1 hour per week; both terms. This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solutions of problems relating to straight lines and planes.

### 161. *Descriptive Geometry*:—J. R. Cockburn.

Department 4, I Year; 1 hour per week; both terms.

This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solution of problems relating to straight lines and planes, special reference being made to the determination of shades and shadows.

### 162. *Descriptive Geometry*:—J. R. Cockburn.

Departments 1, 2, 3, 7 and 8, II Year; 1 hour per week, both terms. This course of lectures is a continuation of the work taken in the first year with the following additions: Problems relating to curved surfaces, principles of shades, shadows and perspective.

### 163. *Descriptive Geometry*:—J. R. Cockburn.

Department 4, II Year; 1 hour per week, both terms.

This course of lectures is a continuation of the work taken in the First Year with the addition of problems relating to curved surfaces, shades, shadows and perspective.

### 164. *Descriptive Geometry*:—J. R. Cockburn.

Department 1, III Year; 1 hour per week, first term.

This course of lectures deals with spherical projections, the principles of mapmaking, and the graphical solution of spherical triangles.

**165. Descriptive Geometry:**—J. R. Cockburn.

Department 4, III Year; 1 hour per week, first term.

Advanced work in shades, shadows and perspective.

**166. Engineering Drawing:**—J. R. Cockburn.

Departments 1, 2, 3, 7 and 8, I Year; 11 hours per week, first term; 18 hours per week, second term.

Copying from the flat, lettering, topography; graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; the plotting of original surveys; measured drawings.

**167. Architectural Drawing:**—J. R. Cockburn, H. H. Madill.

Department 4, I Year; 9 hours per week first term; 18 hours per week, second term.

Copying from the flat, lettering, rendering the graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; measured drawings. Elements and principles of Architecture.

**168. Engineering Drawing:**—J. R. Cockburn.

Department 6, I Year; 4 hours per week, both terms.

Copying from the flat, lettering, graphical solution of problems in statics, problems in descriptive geometry.

**169. Engineering Drawing:**—J. R. Cockburn.

Departments 1 and 2, II Year. Department 1,  $4\frac{1}{2}$  hours per week, first term;  $13\frac{1}{2}$  hours per week, second term. Department 2, 3 hours per week first term; 12 hours per week, second term.

Colouring and shading as applied to both topographical and construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics and strength of materials; measured drawings; elementary design.

**170. Engineering Drawing:**—J. R. Cockburn.

Departments 3 and 7, II Year; Department 3, 13 hours per week, first term; 11 hours per week second term; Department 7, 12 hours per week, both terms.

Coloring and shading as applied to construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics, theory of mechanism and strength of materials; measured drawings; elementary design.

**171. Architectural Drawing:**—J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.

Department 4, II Year; 17 hours per week, both terms.

Exercises from the orders of architecture; principles of shades, shadows and perspective; elementary architectural design; problems in descriptive geometry relating to solids bound by curved surfaces; solution of problems in optics and strength of materials; measured drawings.

**172. Engineering Drawing:**—J. R. Cockburn.

Department 6, II Years; 7 hours per week, first term; 3 hours per week, second term.

Department 8, II Year; 3 hours per week, first term; 6 hours per week, second term.

(Same as Department 3 with the exception that Dept. 6 has no descriptive geometry.)

**173. Engineering Drawing:**—J. R. Cockburn, C. R. Young.

Department 1, III Year; 15 hours per week first term; 12 hours per week, second term.

Principles of mapmaking, spherical projection, plotting of original surveys relating to topographical and railway work; problems in theory of construction; original design of various structures; measured drawings.

**174. Engineering Drawing:**—J. R. Cockburn.

Department 2, III Year; 9 hours per week, first term.

Plotting of original surveys, relating to topographical and railway work and mining; problems in theory of construction; original design; measured drawings.

**175. Architectural Drawing:**—J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.

Department 4, III Year; 18 hours per week, both terms.

Architectural design; advanced work in monochrome and colours; problems in shades, shadows and perspective; problems in theory of construction, including framed structures.

**176. Architectural Drawing:**—J. R. Cockburn.

Department 4, III Year; 1 hour per week, first term.

Advanced work in shades, shadows and perspective.

**177. Engineering Drawing:**—J. R. Cockburn, C. R. Young.

Departments 3, 6 and 8, III Year; Department 3, 9 hours per week, first term; Department 6, 6 hours per week, first term; Department 8, 3 hours per week, first term.

Problems in design dealing with the theory of structures.

**178. Structural Design Drawing:**—C. R. Young, W. J. Smither.

Department 1, IV Year; 22 hours per week, both terms.

Problems in structural design.

179. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Department 1, IV Year; 4 hours per week, first term; 8 hours per week  
 second term.  
 Problems in structural design.
180. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Departments 3 and 4, IV Year; 3 hours per week, both terms.  
 Problems in mill building design.
181. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Department 3, IV Year; 4 hours per week, first term; 6 hours per week,  
 second term.  
 Problems in structural design.

### ENGINEERING PHYSICS

185. *Illuminating Engineering and Optics*:—G. R. Anderson.  
 Departments 1, 3, 6, 7, I Year.  
 Rectilinear propagation of light, illumination, photometry, light standards.  
 Distribution of light by reflectors and diffusers, general and selective absorption, economic values of artificial lights.  
 Illumination calculations.  
 Laws of reflection and refraction, theory of optical instruments.  
 Light considered as wave motion, dispersion, spectrum analysis, colour phenomena, polarization.  
 Lectures and laboratory work, both terms.
186. *Hydrostatics*:—G. R. Anderson.  
 Departments 1, 3, 6, 7, II Year.  
 Laws of fluid pressure and application to machines. Density of solids, and fluids, theory of flotation.  
 Lectures and laboratory work. Spring term.
187. *Heat*:—G. R. Anderson.  
 Departments 1, II Year.  
 Generation and propagation of heat. General and industrial thermometry, calorimetry and pyrometry. Linear and cubical expansion, gas laws. Specific heat of solids, liquids and gases, latent heat of fusion and vaporization. Mechanical equivalent of heat. Carnot cycle.  
 Lecture and laboratory work, Fall term.
188. *Photography*:—G. R. Anderson.  
 Department 1, II Year.  
 The camera and its adjustments, lenses, shutters, screens. Plates for various purposes, films, prevention of halation. Lighting, exposure, development. Paper of various kinds, printing, enlarge-

ment and reduction, blue printing and allied processes. Record photography, photogrammetry and photo-surveying. Photography in colour.

Lectures Fall term, and laboratory work both terms.

**189. *Illumination*:**—G. R. Anderson.

Department 4, II Year.

Principles of interior and street illumination. Artificial lighting of public and private buildings, etc.

**190. *Acoustics*:**—G. R. Anderson.

Department 4, III Year; Department 7, IV Year.

Wave motion, propagation, reflection and transmission of sounds.

Laws of vibrating strings, pipes and forks. Velocity of sounds.

Musical scales. Absorption of sound by various substances, use of deadening material in buildings. Amount of reverberation permissible and desirable in public buildings. Lectures and laboratory work.

**191. *Photographic Surveying*:** G. R. Anderson.

Department 1a, IV Year; 1 hour lecture and 2 hours laboratory, first term.

This course presupposes a general knowledge of photographic processes as given in the second year. Treatment of a photograph as a perspective drawing from which plan and elevation to scale may be obtained under certain conditions. The intersection method of photographic surveying, its advantages and limitations. The stereoscopic method with its advantages and disadvantages. Method of plotting. Accuracy of results.

## GEOLOGY

**193. *Field Work*:**—E. S. Moore.

Department 2, III Year; one week preceding the opening of the first term.

**194. *Pleistocene Geology and Physiography*:**—A. MacLean.

Department 2, IV Year; 1 hour per week, both terms.

*Pleistocene Geology*.—Lectures on the formation and distribution of the drift deposits of North America, with brief references to other regions. Glacial, Interglacial and Postglacial beds are described, changes of climate are discussed with their probable causes, and the economic features of the clays, sands, and gravels are pointed out. A weekly excursion is made during October and November to points of interest near Toronto, which is the centre of the most important development of the Pleistocene in America.

*Physiography.*—A course of lectures on the surface forms of the earth, with the geological factors which have produced them. The broad features of the earth, its plains, tablelands, hills, valleys, mountains, oceans, rivers, and lakes are discussed in a general way, methods of topographical surveying and mapping are referred to, and the chief physiographic areas of Canada are described.

195. *Elementary Geology:*—W. A. Parks.

Departments 1, 2, II Year; 2 hours per week, second term.

This course deals chiefly with historical geology with special reference to Canadian formations.

Works of Reference:—Introduction to Geology—Scott; Elementary Geology—Coleman and Parks.

196. *Geology and Ore Deposits:*—A. MacLean.

Department 8, II Year; 2 hours per week, both terms.

Lectures and laboratory work on historical, structural, and economic geology, designed to familiarize the student with the more important principles, facts, and terms of general geology.

Works of Reference:—As in Course 195.

197. *Engineering Geology:*—A. MacLean.

Department 1, III Year; 1 hour per week, both terms.

This course deals with the application to engineering of dynamic, structural, and economic geology.

Works of Reference:—Engineering Geology—Ries and Watson.

198. *Dynamic and Structural Geology:*—A. MacLean.

Department 2, III Year; 1 hour per week, first term.

Lectures on geological forces and their effects. Particular attention is given to those aspects of the subject which apply in mining.

199. *Precambrian Geology:*—E. S. Moore.

Department 2, IV Year; 2 hours per week, first term.

Lectures on the Precambrian formations of Canada—their rocks, distribution, relationships, and economic features. Briefer accounts are given of similar formations in the United States and elsewhere.

Works of Reference:—Reports of the Geological Survey of Canada and of the Ontario Department of Mines; Reports of the United States Geological Survey.

200. *Mining Geology:*—E. S. Moore.

Department 2, IV Year; 2 hours per week, second term.

A course of lectures on geological problems associated with mining, typical mining regions in Canada, the United States, and elsewhere being discussed from the geological side.

Works of Reference:—Mineral Industry; Ore Deposits of United States and Canada—Kemp; and the works mentioned under Course 199.

201. *Geological Excursions*:—The Staff in Geology.

Department 2, IV Year.

During October and November weekly trips will be made to points of interest near Toronto.

202. *Economic Geology*:—E. S. Moore.

Department 2, III Year.

(a) *Ore Deposits*: 1 hour per week, both terms.

Discussion of the origin and classification of ore deposits, the mode of occurrence of the chief ores, and statistics of production. Special attention is given to the metals mined in Canada.

(b) *Economic Geology of the Non-metals*: 2 hours per week, second term.

Lectures on the origin and mode of occurrence of the valuable non-metallic substances—coal, oil, building stone, gypsum, cement materials, etc.

Works of Reference:—Economic Geology—Ries; General Economic Geology—Emmons; Coal—Moore; Practical Oil Geology—Hager.

203. *Economic Geology*:—E. S. Moore.

Department 2, III Year; 2 hours per week, second term.

Laboratory work on ores, manner of occurrence, vein structure, etc., also the examination and construction of geological maps and sections of typical mining regions.

204. *Special Geology*:—A. MacLean.

Department 1, Option e, IV Year; 1 hour lecture and 1½ hour laboratory work per week, second term.

A lecture and laboratory course on superficial geology, physiographic control, water geology, etc.

Works of Reference:—Political and Commercial Geology—J. E. Spurr.

## HYDRAULICS

205. *Hydraulics*:—R. W. Angus.

Departments 1, 2, 3, 6, 7, III Year; 2 hours per week, both terms.

This is a course of lectures in hydraulics devoted to the development and discussion of formulae relating to the flow of water in pipes, the measurement of discharge by various methods, such as orifices and weirs, the conditions of flow obtaining in open channels, artificial and natural, and in pipes flowing partially full, together with other kindred subjects.

The object of this course is to provide the student with a good working knowledge of the fundamental principle of hydraulics, such as is useful in practical work, and is necessary to the intelligent investigation of more advanced problems, such as the design of water supply, sewerage and irrigation system, and water power plants.

206. *Hydraulic Laboratory*:—R. W. Angus, R. Taylor.

Departments 1, 3, III Year; one 3 hour period per week, second term.  
Departments 6, 7, III Year; 4 periods of 3 hours each.

The work in this course is intended to illustrate the lecture course given in hydraulics and to give the student some working acquaintance with the formulae met with in practice. Experiments are made to determine the coefficients for orifices of the various types used in practice and for a weir. The results of these experiments are used in measuring the discharge in subsequent experiments on meters and for the determination of hydraulic resistances in various cases of flow in pipes. The complete course illustrates very fully the application of the course of lectures to actual cases.

207. *Hydraulics*:—R. W. Angus.

Departments 1, 3, 7, IV Year; 1 hour per week, both terms.

A study of the collection of stream flow data is followed by an investigation of precipitation and evaporation and their relation to run-off. The application of this information to the design of irrigation works is discussed in some detail and also a problem on the design of a complete hydraulic power plant, including the canal, is worked out, and this is supplemented, where possible, by a problem on an irrigation system. Application of the work is also made to the design of such a problem as is presented by a storm sewer.

208. *Hydraulics*:—R. W. Angus.

Departments 1, 3, 7, IV Year; 2 hours per week, both terms.

The most important question considered and to which most of the lectures are devoted is the theory of turbines and centrifugal pumps, the effect of the design on the speed, discharge power and efficiency being fully taken up. This course also includes some of the problems mentioned in the previous course, such as the proper selection of irrigation pumps, water turbines, etc.

Text Books:—Centrifugal Pumps—Daugherty Water Power Engineering—Mead.

209. *Hydraulics*:—R. W. Angus, R. Taylor.

Departments 1, 3, 7, IV Year; about 10 hours per week in 3 hour periods.

A laboratory course devoted to experimental work on turbines of various types and centrifugal and turbine pumps and other similar devices. This experimental work is arranged to illustrate the lectures on turbine and pump design. The experiments are made on two large turbine pumps used in the laboratory supply, as well as on apparatus specially designed for instruction. Various methods of measuring water-power and the efficiency of machines are also given. A list of the equipment now available, and which is used in this course, is given at the end of the Calendar.

**210. *Hydraulic Laboratory:***—R. Taylor.

Departments 2, 8, IV Year; 3 hours per week, second term.

A laboratory course of experiment on orifices, weirs and meters.

**211. *Hydraulics:***—R. Taylor.

Department 1<sub>b</sub>, 1<sub>e</sub>, IV Year, one hour lecture per week, first term.

A laboratory course of 3 hours per week, first term, on measurement of water, flow in open channels and on pumps.

### HEAT ENGINES

**216. *Steam Engines:***—E. A. Allcut.

Departments 3, 7, II Year; 1 hour per week, both terms.

Departments 2, 8, II Year; 1 hour per week, one term.

This course of lectures includes a discussion of the principles of action of the steam engine; also the theory and design of various simple forms of valve gears used in the operation of such engines.

**217. *Thermodynamics:***—E. A. Allcut.

Departments 3, 6 and 7, III Year; 2 hours per week.

A lecture course in which the subject is treated in such a way as to make it of practical value and give a working acquaintance with the principles on which it is based. After the elementary ideas have been given and the proofs of the properties of Carnot's cycle, applications of the subject are made to the perfect gas, air, saturated steam and to the various types of engines.

**218. *Heat Engines:***—E. A. Allcut.

Department 3, III Year; 2 hours per week, both terms.

Department 7 and 8, III Year; 1 hour per week, both terms.

This course in heat engines is intended for students in Mechanical, Electrical and Metallurgical Engineering, to be supplementary to the general course of lectures in thermodynamics.

The principal commercial forms of heat engines are dealt with in a more or less descriptive manner; special attention is given to considerations affecting the design of the ordinary forms of steam engines, gas engines and oil engines.

219. *Thermodynamics and Mechanical Laboratory*:—R. W. Angus, E. A. Allcut, H. A. Tuttle.  
Department 3, III Year; one 3 hour period per week, both terms.  
Department 7, III Year; 2 hours per week, first term;  $1\frac{1}{2}$  hours per week, second term. Time to be in three-hour periods.  
This laboratory course is designed to assist in a clearer understanding of thermodynamics, machine design and mechanics of machinery. The work in thermodynamics consists in the setting of slide valves, indicating engines measuring the brake horse-power, simple engine and boiler tests and the testing of gas and gasoline engines under various conditions. The mechanical laboratory work deals with the efficiency of belts as well as of several machines of simple construction. An examination of lubricating oils is also made by means of well-known methods. Experiments are also made on the balancing of reciprocating and rotating masses.
220. *Thermodynamics*:—E. A. Allcut.  
Departments 3 and 7, IV Year: 2 hours per week; both terms.  
This is a continuation of the introductory course, the subject being here treated from a general standpoint and the idea of entropy and of the absolute scale of temperatures being introduced. The course includes the treatment of saturated and superheated vapours, gases, the flow of fluids, chimney and boiler efficiency and the theory of various engines and other appliances including air compressors, refrigerating machines, and injectors.
221. *Thermodynamics*:—E. A. Allcut.  
Departments 3, 7, IV Year; 1 hour per week, both terms.  
Steam Power Plants. This course follows in logical order the courses on heat engines given in the second and third years. In it a study of the prime movers and auxiliary apparatus required in a power plant is made in such a manner as to indicate the proper choice of equipment under conditions of operation.
222. *Thermodynamics*:—R. W. Angus, E. A. Allcut, H. A. Tuttle.  
Departments 3 and 7, IV Year; about  $9\frac{1}{2}$  hours per week, in 3 hour periods.  
The work in this year is a continuation and extension of the work covered in the third year laboratory course. Careful tests are made of engines of various types, such as simple, tandem and cross-compound steam engines; steam turbines; refrigerating machines; injectors and steam pumps, etc.; and an application is made of Hirn's analysis and the entropy diagram to the results obtained. A complete set of experiments is made on each machine and the result plotted so as to show clearly to the student the effect of various alterations in the adjustment of the engine on the resulting efficiency.

Several modern gas and gasoline engines and a gas producer give ample opportunity for the study of this type of engine, and facilities are provided for sampling the gas supply and exhaust.

Two experimental stacks and three boilers enable results to be obtained on boiler efficiency and chimney draft.

**223. Thermodynamics:**—E. A. Allcut.

Department 1, III Year; one hour lecture per week, both terms; 2 hours per week laboratory, second term, time to be in 3 hour periods. Departments 2, 8, one hour lecture per week, both terms.

This course is especially designed to give the student a working knowledge of thermodynamics as applied to the perfect gas and steam so that he will be able to understand clearly the action of air compressors, steam engines, etc. After deducing general principles, the efficiency of compressed air transmission and the relative merits of different types of compressors are examined. The steam engine and boiler are also studied.

**224. Thermodynamic Laboratory:**—H. A. Tuttle.

Department 6, III Year; 7 three-hour periods; Departments 2 and 8, IV Year; 3 hours per week, first term.

A course of experiments with steam and gas engines, compressed air, etc.

**225. Motive Power:**—R. W. Angus.

Department 1, Option e, IV Year; one hour per week, both terms.

A course of lectures covering boiler capacity, locomotive horse-power, tractive effort, etc., necessary to carry specified trains over different conditions of roadbed.

## MACHINERY

**230. Theory of Mechanism:**—J. H. Parkin.

Departments 2, 3 and 7, II Year; lectures 2 hours per week; problems  $1\frac{1}{2}$  hours per week, both terms.

This course of lectures treats of the elementary construction of machines and of the motions of the various parts. Methods of determining linear and angular velocities, methods for the solution of elementary problems involving forces and methods for the determination of the mechanical efficiency of machines are discussed. Velocity diagrams, crank effort and torque diagrams are plotted. Cams, toothed gearing and various types and applications of trains of gearing are considered.

Applications of the methods described are made to various machines including engines, machine tools, link motions, etc., and the lecture work is followed up by the solution of numerous examples in the drafting room.

**Text Book:**—Theory of Machines—Angus.

231. *Mechanics of Machinery*:—J. H. Parkin.

Departments 3 and 7, III Year; 1 hour per work, both terms.

This course is devoted to a consideration of the speed regulation and balancing of machines, and comprises lectures on the theory of various forms of governors, kinetic energy of machines and determination of speed fluctuations, the proper weight of flywheel, acceleration and inertia effects, and balancing.

The methods of analysis employed are those developed in course 230.  
Text Book:—Theory of Machines—Angus.

232. *Elementary Machine Design*:—J. H. Parkin and U. C. Holland.

Departments 3, 6 and 7, II Year; 1 hour per week, both terms.

This is a preparatory course intended to familiarize the student with the different shop methods and processes, casting, forging, machining, etc., used in the production of machine parts, to enable him to make proper provision in the design of such parts to facilitate their production.

In addition, the various standards, machine and pipe threads, tapers, pipe fittings, etc., are described and mechanical drafting room practice explained.

Tolerances, limits, fits and gauges are discussed.

The design of simple machine fastenings and parts is taken up and examples worked out in the drafting room.

233. *Machine Design*:—J. H. Parkin.

Departments 3, 7 and 8, III Year; 2 hours per week, both terms.

Departments 6, IV Year; 1 hour per week, both terms.

The design work occupies 7 hours per week for Department 3,  $4\frac{1}{2}$  hours per week for Department 7 and 3 hours per week, second term only for Departments 3, 6 and 8. The periods are of not less than 2 hours and preferably 3 hours duration.

The lectures in this course deal with the design of various machine elements, including shafting, bearings (journal, thrust, ball and roller), belts, pulleys, flywheels, clutches, springs, machine frames, etc.

The problems worked out in the drafting room are planned to include the design of all of the above and with a view to developing the student's judgment and sense of proportion in design.

Text Book:—Machine Design—Leutwiler.

234. *Advanced Machine Design*:—J. H. Parkin.

Department 3, IV Year; lectures 1 hour per week, design 5 hours per week (one 2-hour and one 3-hour period), both terms.

The work of this course is devoted to the design of complete machines with the object of giving the student practice not only in the design of various details, but also in working in the various

elements into a machine of smooth and harmonious design. The machines chosen as examples for design involve as many new machine elements as possible in order to broaden the training of the student.

Text Book:—Machine Design—Leutwiler.

## MATHEMATICS

- 236. *Calculus:***—A. T. DeLury.

All Departments, I Year; 2 hours per week, each term.

Treatment of limits with special reference to those pertaining to exponentials and logarithms. Derivation of the fundamental formulae of the differential and integral calculus, with early application to simple problems concerning graphs, areas, volumes, lengths, etc.

- 237. *Calculus:***—S. Beatty and J. L. Synge.

Departments 1, 3, 6 and 7, II Year; 1 hour per week, both terms.

Continuation of course 236. The elementary theory reviewed and extended. Special attention to applications with problems in Engineering mostly in view.

- 238. *Analytical Geometry:***—I. R. Pounder.

All Departments, I Year; 1 hour per week, first term, 2 hours per week, second term.

The course in Elementary Analytical Geometry covers the more familiar propositions in connection with the straight line, circle, parabola, ellipse and hyperbola. The subject is treated so as to illustrate the general methods of analytical geometry.

- 239. *Trigonometry, Spherical:***—L. B. Stewart.

Department 1, II Year; 1 hour per week, first term.

A course of lectures includes the derivation of formulæ and their application to the solution of triangles and to practical problems.

Text Book:—Spherical Trigonometry—Todhunter and Leatham.

- 240. *Least Squares, Method of:***—L. B. Stewart.

Department 1, III Year; 1 hour per week, second term.

The course of lectures includes: The general principles of probability, the law of error, direct measurements of equal and different weights; mean square and probable errors; indirect measurements; conditioned observations; applications to empirical constants and formulæ, etc.

Text book:—Least Squares—Merriman.

## METALLURGY

241. *Elementary Metallurgy:*—G. A. Guess.

Departments 1, 2, 3, 6 and 8, II Year; 1 hour per week, second term.  
A course of about 12 lectures on furnace metallurgy and present practice, with special reference to iron and steel.

242. *Fuels and Combustion:*—G. A. Guess.

Department 8, II Year; 1 hour per week, both terms.  
A lecture course dealing with fuels, their use, preparation, calorific value and combustion.

243. *Metallurgy:*—G. A. Guess.

Departments 2, 6, III Year; 1 hour per week, both terms.  
Fuels, temperature of combustion, specific heat, conductivity and problems thereon; chimneys, furnaces, refractories, outline of furnace metallurgy and hydro-metallurgy.

244. *Physical Metallurgy:*—O. W. Ellis.

Departments 2, 3, 6 and 7, III Year; 2 hours per week, second term.  
The physical properties and structure of iron and steel and the more common alloys.

245. *Metallurgy:*—G. A. Guess, J. E. Toomer.

Department 8, III Year; 2 hours per week, first term; 1 hour per week, second term.  
A lecture course on General Metallurgy accompanied by 3 hours laboratory per week, first term, and 6 hours per week second term.

246. *Physical Metallurgy:*—O. W. Ellis.

Department 8, III Year; 1 hour per week, both terms.  
Changes of phase and of state, pyrometry, preparation of alloys, miscibility of metals, binary, ternary and complex alloys, the use of the microscope, with 3 hours laboratory per week, first term.

247. *Metallurgy:*—G. A. Guess, J. E. Toomer.

Departments 2 and 6, IV Year; 1 hour lecture per week, both terms; 6 hours laboratory per week, second term.  
General metallurgy and metallurgical problems.

248. *Metallurgy Problems:*—G. A. Guess, J. E. Toomer.

Department 8, IV Year; 2 hours lecture and 4 hours laboratory, both terms.  
Metallurgical book-keeping, balance sheets, thermal balance sheets, methods and processes.

249. *Metallurgy*:—G. A. Guess.

Department 8, IV Year; 1 hour per week, both terms.

Critical reading and discussion of papers and articles, describing metallurgical processes or dealing with plant arrangement and construction. Metallurgical flow sheets of typical plants.

250. *Physical Metallurgy*:—O. W. Ellis.

Department 8, IV Year; 1 hour lecture and 4 hours laboratory per week, both terms.

251. *Metallography*:—O. W. Ellis.

Department 2, IV Year.

A laboratory course of 3 hours per week, second term.

252. *Physical Metallurgy*:—O. W. Ellis.

Department 1, IV Year; 1 hour per week both terms.

The physical properties of metals and alloys used in Civil Engineering practice—specifications.

## MINERALOGY

255. *Elementary Mineralogy*:—J. E. Thomson.

Department 2, I Year; 2 hours per week, first term.

After introducing the student to the chief chemical, physical, and crystallographic characteristics of minerals, the course becomes descriptive and deals with about one hundred of the minerals most important from the industrial or scientific point of view.

Text Book:—Study of Minerals and Rocks—Rogers.

256. *Mineralogy*:—J. E. Thomson.

Department 6 and 8, I Year; 3 hours per week, one term.

Introduction to determination of minerals by inspection and physical tests.

Text Book:—Mineral Tables—Eakle.

257. *Primary Mineralogy*:—A. L. Parsons.

Department 1, II Year; 2 hours per week, first term.

A very brief introduction to the study of minerals and rocks.

Text books:—Study of Minerals and Rocks—Rogers; Hand-Book of Rocks—Kemp.

258. *Mineralogy*:—J. E. Thomson.

Department 2, I Year; 1 hour per week, first term; 3 hours per week, second term.

Determination of minerals by inspection and by means of physical tests; introduction to blow-pipe practice.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

259. *Mineralogy*:—A. L. Parsons, J. E. Thomson.

Department 1, II Year; 1 hour per week, first term; 2 hours per week, second term.

Determination of minerals by inspection and by means of physical tests; study of common rock types and their identification.

Text books:—Mineral Tables—Eakle; Handbook of Rocks—Kemp.

260. *Elementary Petrography*:—T. L. Walker.

Department 2, II Year; 1 hour per week.

A course of lectures and laboratory work introducing the student to the macroscopic study of rocks.

Text-books:—Handbook of Rocks—Kemp.

261. *Mineralogy*:—J. E. Thomson.

Department 2, II Year; 2 hours per week.

Determination of minerals by means of the blow-pipe and physical properties.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

262. *General Petrography*:—A. L. Parsons.

Department 2, III Year; 1 hour per week.

Study of the chief rock-forming minerals and of some phases of petrography not covered in the course of the previous year.

Text Books:—Minerals in Rock-Sections—Luquer; Petrology for Students—Harker.

263. *Petrography*:—T. L. Walker.

Department 2, III Year; 2 hours per week, both terms.

Study of the chief rock-forming minerals, of rocks in thin sections and in hand specimens.

Text books:—Petrology for Students—Harker; Minerals in Rock Sections—Luquer.

## MODERN LANGUAGES

266. *French*:—J. H. Cameron, Miss J. C. Laing, L. A. Bibet.

Required in Department 4, First Year; 2 hours per week, both terms; II and III Years, 1 hour per week, both terms.

*First Year*

(a) Practice in translation of a selected text bearing on some phase of architectural study (for example, History of Art, History of France, extracts from great French writers), this text being used as a basis for discussion on various aspects of the student's work.

(b) A course in Conversation to encourage the student to acquire a speaking knowledge of the language.

*Second Year*

- (a) A reading course intended to introduce the student to the best literature on architectural subjects; prescribed text: *Guadet: Éléments et théorie de l'architecture*, to which may be added other reading selected from time to time.
- (b) Conversation course continued from I Year.

*Third Year*

A continuation and development of the work of the II Year.

267. *German*:—G. H. Needler, B. Fairley.

Required in Department 6, all years; 1 hour per week, both terms.

An elementary course intended to train the student in the translation of scientific journals and treatises.

268. *Spanish*:—M. A. Buchanan.

Departments 6, 8, II Year; 1 hour per week, both terms.

An introduction to Spanish grammar, pronunciation and practice in reading Engineering Spanish.

**SURVEYING**

270. *Surveying*:—S. R. Crerar.

Departments 1, 2, 3, 7 and 8, I Year; 1 hour per week, both terms. The lecture course includes the general principles; surveying with the chain, the compass and chain and the transit and chain, and level, the applications of trigonometry to inaccessible heights and distances; mensuration of surfaces, co-ordinate surveying, division of land, etc.

Text books:—Plane Surveying—Tracy; Theory and Practice of Surveying—Johnston and Smith; Elementary Surveying—Breed and Hosmer.

271. *Field Work*:—S. R. Crerar, J. W. Melson.

Departments 1, 2, 3, 7 and 8, I Year; 5 hours per week, first term. This course comprises testing chains; practice in chaining; a complete survey of a piece of land with the chain and transit; keeping of field notes; the use of the transit and compass in surveying closed figures and traverse lines and in ranging straight lines; plotting by latitudes and departures, and otherwise computing areas. Instrumental work with level.

272. *Surveying*:—W. M. Treadgold, E. W. Banting.

Departments 1 and 2, II Year; 1 hour per week, both terms.

This course of lectures takes up in detail, simple, reverse and compound curves as applied to railroad surveying. It also includes stadia, plane table and photographic surveying as applied to topographic work, and the main features of mine and hydrographic surveying.

Text books:—Henck, Searles, Allen (Field books for Engineers) Theory and Practice of Surveying—Johnston and Smith; Surveying—Breed and Hosmer.

273. *Field Work*:—W. M. Treadgold, E. W. Banting.  
 Department 1, II Year; 9 hours per week, first term.  
 Department 2, II Year; 6 hours per week, first term.  
 This course of instruction embraces all adjustments of the transit and level, minor problems in triangulation and traversing—levelling and plane table practice.
274. *Surveying and Levelling*:—W. M. Treadgold.  
 Department 1, III Year; 1 hour per week, both terms.  
 This course of lectures takes up the work of the railroad engineer on construction, including profiles, cross sectioning, computation of volume of earthwork, overhaul, transition curves; laying out turnouts, frogs and switches, etc.  
 Also a discussion of trigonometric and barometric levelling.  
 Text books:—Field Engineering—Searles; Railroad Curves and Earthworks—Allen.
275. *Survey Camp*:—W. M. Treadgold, S. R. Crerar, E. W. Banting, J. W. Melson.  
 Departments 1 and 2, III Year.  
 This course includes:  
 (a) Secondary Triangulation and Base Line Measurements.  
 (b) Stadia, Plane Table and Boundary Traverses.  
 (c) Highway and Railway Location.  
 (d) Cross Sectioning and Computation of Earthwork.  
 (e) Stream Gauging and Discharge Measurements.  
 (f) Hydrographic Surveying.  
 (g) Photographic and Micrometer work.  
 (h) Stadia and Plane Table Topography.  
 (i) Observations for Time, Azimuth and Latitude. This work is taken at Gull Lake Camp. See page 23.
276. *Railroad Location and Design*:—W. M. Treadgold.  
 Department 1, Option "e," IV Year; 1 hour lecture per week, both terms; about 8 hours per week, both terms, in the drafting room.  
 This work will consist of an original survey for a railroad some one or two miles in length, the work to be carried out according to the most modern methods of location. Upon the completion of the field work, the complete survey will be plotted and a line adjusted to it. This will be staked out, profiles taken and the computation made of the earthwork and the preparation of overhaul diagram compiled for determination of haul and borrow. In the second term the design of track work, yards and practical problems will be taken up and special problems assigned.

#### ADDITIONAL FOURTH YEAR COURSES

280. *Sanitary Engineering*:—Peter Gillespie.  
 Department 1<sub>b</sub>, IV Year; 1 hour lecture per week, both terms; 3 hours laboratory, first term; and 6 hours, second term.

Consideration is given to the problems of water supply and sewerage disposal as viewed by the engineer. Some practice in the design of works from assumed data is afforded.

Reference Books:—Public Water Supplies—Turneaure and Russell; American Sewerage Practice—Metcalf and Eddy, 3 vols.

**281. Highway Engineering:**—A. T. Laing.

Department 1<sub>b</sub>, IV Year; 1 hour lecture and 3 hours laboratory per week, both terms.

This course of instruction deals with the design, construction and maintenance of public highways and street pavements, also with the properties of the materials employed. Accompanying the course of lectures is a laboratory course dealing with the various bituminous and non-bituminous materials of construction.

**282. Municipal Seminar:**—P. Gillespie, A. T. Laing.

Department 1<sub>b</sub>, IV Year; 3 hours per week, both terms.

This time is devoted to reading, essay writing and discussion of problems relating to highways, town planning, sanitation and kindred subjects.

**283. Zymology:**—H. B. Speakman.

A study of the phenomena of fermentation and their industrial applications.

### THESIS

**285. Thesis.**

Required in all Departments, IV Year, with the exception of Department 4, Architectural Design Option.

Each student is required to prepare a thesis of between six thousand and seven thousand words on a subject approved by Council. See circular of information.

### OUTLINE OF VACATION WORK

**286. Construction Notes.**

II Year. Departments 1, 2, 3, 4, 6, 7.

The construction notes required consist of neat and complete dimensioned sketches in pencil of any structures, machines or plants which may be of interest. Any object chosen should be represented and dimensioned in such a manner that it could be completely constructed from the notes as the only available information. (See page 21.)

From students in Department 2, who have been actually engaged during the summer with Government or other approved geological survey parties, geological field notes will be accepted in lieu of construction notes.

### MASTER OF APPLIED SCIENCE DEGREE

### MASTER OF ARCHITECTURE DEGREE

- 1A.** A candidate for the degree of M.A.Sc. shall hold the degree of B.A.Sc. of this University or a degree from some other University recognized as equivalent by the Council of the School of Graduate Studies.

- 1B. A candidate for the degree of Master of Architecture should hold the degree of Bachelor of Architecture or the degree of Bachelor of Applied Science in Architecture of this University or a degree from some other University recognized as equivalent by the Council of the School of Graduate Studies.
2. He shall register with the Secretary of the School of Graduate Studies at the beginning of the academic year.
3. Not later than November 1 of his academic year, he shall submit to the Secretary for acceptance by the School of Graduate Studies the title of his proposed thesis as approved by the department concerned.
4. Not later than April 30th of his academic year, he shall present evidence to the Council of the School of Graduate Studies that he has spent not less than one academic year of the department concerned as a student enrolled in one of the following departments on a course of study approved by the department:—Civil Engineering, Mining Engineering, Mechanical Engineering, Architecture, Chemical Engineering, Electrical Engineering, Metallurgical Engineering.
5. Not later than April 30th of his academic year, evidence that the candidate has satisfactorily met all the requirements of the department with regard to thesis and to such examinations as the department shall require, shall be forwarded to the Council of the School of Graduate of Studies through the sub-committee administering the regulations governing the degrees of M.A.Sc. and M.Arch.

### PROFESSIONAL DEGREES

The attention of graduates is directed to the following regulations respecting professional degrees.

The following degrees have been established: Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem.E.), Metallurgical Engineer (Met.E.), subject to the following regulations:

1. A candidate for one of the said degrees shall hold the diploma of the School of Practical Science or of the Faculty of Applied Science and Engineering or the degree of Bachelor of Applied Science.
2. He shall have spent at least three years after receiving the diploma or the degree in the actual practice of the branch of engineering wherein he is a candidate for a degree.
3. Intervals of non-employment or of employment in other branches of engineering shall not be included in the above three years. It shall not be necessary that the several periods requisite to make up the said three years be consecutive.

4. Satisfactory evidence shall be submitted to the University examiners as to the nature and length of the candidate's professional experience for the purpose of clauses 2 and 3.  
The Examiners may satisfy themselves by oral or written examinations in regard to the candidate's experience and competence.
5. The candidate shall prepare an original thesis on some engineering subject in the branch in which he wishes a degree, the said thesis to be accompanied by all necessary descriptions, details, drawings, bills of quantities, specifications and estimates.  
The candidates may be required at the option of the Examiners to undergo an examination in the subject of this thesis.
6. Notice in writing shall be sent to the Secretary not later than the first day of November, informing him of the degree to which the candidate wishes to proceed and of the title of his proposed thesis for the approval of the Examiners.
7. The evidence under clause 4, and the thesis, with accompanying papers, described in clause 5, shall be sent to the Secretary not later than the first day of April.
8. The candidate shall be required to present himself for examination in the month of April at such time as may be arranged by the Examiners.
9. The fee for any one of the said degrees shall be twenty dollars, and shall be paid to the Bursar not later than the first day of April.
10. The thesis, drawings, and other papers submitted under clause 7 shall become the property of the University.
11. Nothing in this statute shall prevent any candidate from receiving more than one of the said degrees, provided he has the necessary qualifications for each degree. An interval of three years must elapse between the granting of any two degrees under this statute.
12. All communications must be addressed to the Secretary of the School of Graduate Studies.

#### CERTIFICATE FOR HIGH SCHOOL ASSISTANT

The Calendar of the Ontario College of Education provides for the admission of the holder of a degree in Science to the Course for a High School Assistant's certificate. The regulation requires that the applicant shall submit with his application:

"His certificate of graduation as Bachelor or Master of Arts, Bachelor or Master of Science, Bachelor of Commerce, Bachelor of Agriculture, or Bachelor of Applied Science, from a British University, after the regular university course approved by the Minister of Education as to entrance requirements and as to content of the undergraduate courses. Each applicant must have Upper School or Honour Matriculation standing in English and History and Mathematics or the equivalent of such standing."

## LABORATORY EQUIPMENT

---

### THERMODYNAMIC AND MECHANICAL LABORATORY

The University in 1919 completed the erection of a large, well-equipped building for the accommodation of the steam, gas, mechanical and hydraulic laboratories. A more complete description of the laboratories has been published elsewhere, so that the present description is only intended to give the main features.

The part of the building set apart for thermodynamics and other mechanical work is the ground floor of a room 60 ft. x 155 ft. This room is lighted entirely from the roof in a very perfect way. A part of the space 40 ft. wide running the entire length of 155 feet is served by a 3 ton travelling crane and contains the following equipment:

50 h.p. Brown engine with separate jackets on both heads and barrel of cylinder.

Two-stage Rand air compressor having compound steam cylinders, each fitted with Meyer cut-off gear. The low pressure air cylinder has Corliss inlet gear.

30 h.p. high-speed Leonard tandem compound engine with shaft governor.

15 h.p. high-speed McEwan engine.

75 h.p. two-line compound Willans engine.

25 h.p. General Electric steam turbine.

Two 15 h.p. Leonard engines with different types of valves, which are used for valve setting.

There are also two surface condensers with air pumps so arranged that any engine in the laboratory may be made to exhaust into the atmosphere through an open heater or into one of the condensers, the change from one arrangement to the other being accomplished in a few minutes without the aid of valves.

The laboratory further contains:

A 3 ton York refrigerating machine with tanks.

An Amsler transmission dynamometer.

Apparatus for testing injectors and steam pumps.

Numerous other pieces of apparatus and instruments.

The work on internal combustion engines and producers is performed on the following:

18 h.p. Canada suction gas producer.

14 h.p. National gas engine arranged for various compressions and points of ignition.

10 h.p. Fielding and Platt engine for city gas or coal oil, having various adjustments

8 h.p. Otto gas engine.

25 h.p. Allen semi-Diesel engine.

Various accessories to above machines.

Steam for the laboratory is supplied by two 50 h.p. and one 100 h.p. Babcock and Wilcox boilers, the latter having an internal superheater. These boilers are located in a separate boiler room. They are used for experimental work only and are fitted up for testing. The gases pass up through two independent chimneys, and these have been arranged so that the draft and other conditions in the chimney at any point of its height may be examined.

In smaller work-rooms off the main laboratory are placed belt and oil testing machines, apparatus for testing the efficiency of gears and machines, and for experiments in the balancing of machinery.

### HYDRAULIC LABORATORY

The hydraulic laboratory occupies two floors each 40 feet x 112 feet, which are well lighted by large windows on the side and end.

The water for the experimental work is pumped through the various pieces of apparatus from a well by means of two turbine pumping units, both of which are driven by a Belliss and Morcom compound engine of 125 h.p. running at a speed of 525 revs. per minute. Both engine and pumps have been installed with a view to using them in experimental work as well as for supply of water for other apparatus used in the laboratory.

The pumping units are capable of delivering one cubic foot of water per second against heads of 250 feet and 300 feet respectively. These units are designed and connected up so that they may be run in series giving the above discharge at 550 feet head, or they may be run in parallel giving double the discharge at a lower head. Each pumping unit consists of two two-stage pumps mounted on a common base and driven by a single pulley, and the construction and piping are such that each two-stage pump may be driven separately or that all may be driven at once, discharging separately one cubic foot per second at about 125 feet head through each of four independent pipes, or else the pumps may be run in series or in parallel. The scheme is thus well adapted to laboratory work, and under the heads used on reaction turbines about six cubic feet per second may be obtained.

In addition to this there is an electrically driven pump capable of delivering six cubic feet per second at a head of sixty-five feet and which is most helpful in turbine testing. Attention is called to the special turbine testing flume described below.

The laboratory further contains a large vertical steel tank 5½ feet diameter by 34 feet with arrangements for the attachment of nozzles and other mouthpieces, etc. Connections are also arranged for reaction turbines, the tank acting as a reservoir.

The discharge from the turbines or nozzles is measured in a weir tank nearly 6 feet wide and 21 feet long, containing a contracted weir  $4\frac{1}{2}$  feet wide. This weir may be calibrated by two weighing tanks, each having a capacity of about 240 cubic feet.

There are three reaction turbines and two impulse wheels all ready for experiment, the power being measured by brakes and the water by weir or orifices. Amongst the reaction turbines may be mentioned the one designed and built by Escher Wyss & Co., specially for the laboratory.

A new and specially designed turbine testing flume has recently been added to the laboratory, the machinery for which has been largely furnished through the kindness of the Dominion Engineering Works, Montreal, and Wm. Cramp and Sons, Philadelphia. This flume is supplied with water by a Moody spiral pump of twelve cubic feet per second capacity and at present there are two turbines, one of the propeller type, and also two special draft tubes and more will be added. This provides an excellent opportunity for experiment and research.

Smaller orifice and weir tanks, each about  $3 \times 3 \times 12$  feet with necessary measuring tanks, are arranged for instruction in coefficients of various kinds and practice with weirs and orifices.

A Venturi meter and other meters, also an hydraulic ram and similar devices are available for testing, and good facilities have been arranged for investigating friction and other properties of pipes and fire hose.

For special investigations on turbine and centrifugal pumps, other pumps in addition to those already described have been arranged.

The basement of the laboratory contains an open trough 5 feet wide, about 110 feet long, with a large weir at one end. It is intended to use this trough for experiments on the flow in open channels, for measurements of large discharges by means of the weir, and for experiments with current meters and Pitot tubes.

Numerous pieces of smaller apparatus, together with all instruments required, have also been provided, and the laboratory equipment is believed to be very complete.

#### AERODYNAMIC LABORATORY

A separate special building is being erected into which the aerodynamic laboratory will be moved. The laboratory is fully equipped with 4 ft. wind channel, aerodynamic balance, micromanometers and other necessary instruments. Modifications will be made in the wind channel when moved, permitting higher air speeds to be secured and a greater range of work to be covered.

The work done in the laboratory includes the investigation of problems in aerodynamics, tests of aircraft components and complete machines and the study of the effect of wind pressure on structures.

### AERONAUTIC EQUIPMENT

For the purpose of the scientific study of problems connected with aviation and the best design of aeroplanes, and also of all problems connected with the effect of wind pressure, a standard 4ft. N.P.L. type wind channel has been installed in the Hydraulic Laboratory and equipped with the latest form of balance and all necessary instruments.

There are available for laboratory demonstration and instruction purposes the following aeroplanes:—one S.E. 5A, one Avro Training and two J.N. 4 Curtis Training, all the gift of the Royal Air Force.

The laboratory also contains a number of aeroplane engines of various types, both rotary and stationary, and a number of models. These machines are available for inspection, and are of much help in studying the trend of development and design in the power plant of lightest weight.

### DONATIONS TO THE THERMODYNAMIC AND HYDRAULIC LABORATORIES

The following donations to the equipment of the laboratories have been made through the kindness of those mentioned:

50 h.p. Wheeler Surface Condenser, presented by Mr. F. M. Wheeler, New York.

Blake Feed Pump, presented by the manufacturers.

6-inch New American Turbine, presented by Wm. Kennedy & Sons, Owen Sound, Ont.

Two Crown Water Meters, presented by the National Meter Co., New York, through Mr. M. Warnock, Toronto.

Rock Drill, presented by Sullivan Machinery Co., New York, through Mr. A. E. Blackwood, '95.

Marine Gasoline Engine, presented by Canadian Fairbanks Co., Montreal.

Two engines with different types of valve, presented by Messrs. E. Leonard & Sons, London, Ont.

Bundy trap from American Radiator Co., through Messrs. Russell & Gifford.

Dunham steam trap from C. A. Dunham Co.

Sectional models of valves from American Radiator Co.

Sectional model Mason Reducing Valve by Russell & Gifford.

Tanks, etc., by John Inglis Co.

Pressure Fan from Sheldons Ltd., Galt.

Model water turbine test runner from Wellman, Seaver Morgan Co., Cleveland, O.

Equipment for new turbine testing flume from Dominion Engineering Works, Montreal.

Multi-stage pump from Goldie and McCulloch, Galt.

Hytor vacuum pump complete with motor, etc., from Nash Engineering Co., Norwalk, Conn., through A. S. Leitch and Co., Toronto.

Model water turbine runners from Allis-Chalmers Co., Milwaukee.

Section of Trident water meter from Neptune Meter Co., Toronto.

In addition to the above, other firms have materially assisted by offering apparatus at or below cost price, among whom may be specially mentioned, The Canadian Rand Drill Co., Sherbrooke, Quebec.

The following machines are gifts from the Royal Air Force:

One S.E.5 Scout.

One Avro Training Biplane.

Liberty Aeroplane Motor 400 h.p.

200 B. h.p. Siddeley Deasey Aero Engine.

120 h.p. Beardmore Aero Engine.

Curtis Engine (Sectional).

Hispano Suiza Aero Engine.

80 h.p. Le Rhone Rotary Engine.

Clerget Rotary Engine.

Gnome Monosoupape Engine.

Admiralty Rotary Engine 150 h.p.

Models of Engines, etc., and numerous spare parts.

## ENGINEERING PHYSICS LABORATORIES

### *Illuminating Engineering.*

The laboratories for this work are equipped with 3 metre optical benches for instruction in the fundamental theory of optical instruments. There is also a general equipment consisting of one or more of the following: telescopes, field glasses, microscopes, spectrometers, sextants, range finders, polarizing instruments, etc. For work in illumination there is provided: a 3 metre precision photometer with integrating mirrors and rotator, integrating spheres, radial distribution photometer, portable illuminometers, spectro-photometer, gas light photometer, life racks, etc.

### *Hydrostatic Laboratory.*

The Hydrostatic Laboratory is supplied with various types of hydrometers, hydrostatic balances, pumps, gauges, etc.

### *Heat Laboratory.*

The Heat Laboratory is equipped with a full supply of colorimeters and accessories for determination of latent and specific heat, expansion apparatus, air thermometer, apparatus for verification of Boyle's law and pressure and boiling curve, and for determination of the absolute expansion of mercury, Callendar's apparatus for determination of the mechanical equivalent of heat. Calorimeter for the determination of the value of solid, liquid and gaseous fuels.

*Acoustical Laboratory.*

The Acoustical Laboratory is provided with sonometer, siren, forks ordinary and electric, Lissajous' and Melde's apparatus, organ pipes of various forms, manometric flame apparatus and a special equipment for work in architectural acoustics consisting of torsion chronograph, electro-pneumatic wind chest and standardized organ pipes and other accessories.

The following donations have been received for work in Illuminating Engineering, and are gratefully acknowledged:

Sample board of electric fittings from the Harvey-Hubbell Co., Toronto; Sample board and easel, showing types of condulets, from the Crouse-

Hinds Co., Toronto;

Demonstration sets to show construction of incandescent electric light bulbs, from the Canadian Sunbeam Lamp Co., Toronto;

Lamp rack illustrating various types of incandescent electric bulbs, from the Canadian Westinghouse Co., Hamilton;

Sample board illustrating types of industrial reflectors and elexit and other fittings, Benjamin Electric Co., Toronto.

Govolene Mantle Lamps, Coleman Lamp Co., Toronto.

### PHOTOGRAPHIC AND PROJECTION LABORATORIES

The Photographic Laboratory contains a supply of small cameras for the use of students, enlarging cameras, printers, blue printing machine and the necessary dark rooms.

This Department also carries on a photographic and projection service for all Faculties and Departments of the University. The equipment for this work consists of cameras for making photographs up to full plate size, enlargers, photo-micrographic apparatus, motion picture cameras for both gross and micro work, with the necessary developing and printing machines, a rotary blue print machine, a photostat, etc.

For projection service there is a motion picture projector and a number of projection lanterns for service in any University Building.

### ELECTRICAL LABORATORIES

The Department of Electrical Engineering is located in the Electrical Building. The accommodation includes quarters for staff, library, lecture rooms, laboratories, stores, and shop for repairs and construction.

**Services.**—Three-wire direct-current, 110 kw., from the University power house, automatically regulated at our end for constant voltage of desired value at our main switchboard. Three-phase, 60 cycles, 60 k.v.a., 115 volts, automatically regulated as to voltage and frequency. Three-phase, 25 cycles, 30 k.v.a., automatically regulated as to voltage and frequency. Every laboratory has all three services available at convenient places. There are three main boards, one for each floor. A system of special trunk lines between boards, and tree systems on each floor, enable easy arrangement of any desired special connections from any laboratory to any other.

Alternating current laboratory.—Area 26 x 110 ft., Service sets, 60 and 25 cycles, Tirrill regulators. Two 60-cycle and two 25-cycle, 15 k.v.a. motor-generator sets; converters; various motors, squirrel cage and wound rotor induction types, repulsion and other single-phase types, unity power factor motor, polyphase motor with variable speed shunt characteristics and speed range of 4 to 1; transformers, single and three-phase; constant-current transformers with load of series arc lamps; lamp racks, reactors, condensers, brakes, etc.; oscillographs; indicating, graphic, recording, and demand meters of the best makes; all arranged to facilitate a very general line of experimental work.

Direct current laboratory.—40 kw. 230 to 115 volt motor generator set with Tirrill regulator for special tests. Numerous 5 kw. to 10 kw. motor-generator sets; shunt, series, compound motors; special interpole machines; loading racks, dynamometers, rheostats, numerous meters of first quality, etc., for any sort of study.

Measurements Laboratory.—26 x 110 ft. Fitted with very flexible storage battery service which can be connected to any desired working place; d.c. three-wire service, also 60 and 25-cycle three-phase everywhere; galvanometers, resistance boxes, bridges, shunts, potentiometers, standard cells, bond testers, ductor, megger, apparatus for measuring low resistances, artificial lines for fault measurements, condensers, inductances, rails, cables, voltmeters, ammeters, wattmeters, dynamometers, etc., for general work on a great variety of measurements.

High voltage laboratory.—For various lines of study with voltages up to 200,000 volts. Flexible and safe provision for control.

Materials laboratories.—One specially fitted for general work on conducting materials, one for magnetic materials, one for dielectric materials.

Radio laboratory.—Adapted for the measurement of various quantities of interest in this work, including the strength of incoming signals. One single conductor aerial 1,000 ft. long, one multi-conductor aerial 120 ft. long.

Standardizing laboratories.—One students' calibration room for direct-current meters, another for alternating-current meters. A standards room, constant temperature, for master standards of voltage, resistance, current, power, etc.

Research laboratories.—Four rooms set apart for this work, in combination with facilities of the other laboratories.

Design laboratory—Arranged for calculation work on apparatus selected to illustrate essential principles.

## CHEMICAL LABORATORIES

The Chemical laboratories are situated in the western half of the Chemistry and Mining building, on the first and second floors. The rooms are large and well lighted, and are supplied with the usual modern equipment.

The first and second year laboratory for qualitative work has accom-

modation for 112 students, each working space being supplied with water, gas and fume cupboard. The laboratory for quantitative analysis will accommodate 48 students, and is supplied with commodious fume cupboards and all necessary apparatus. A laboratory with working places for 36 is provided for the students engaged in the study of technical chemistry; it is equipped with appliances for the preparation and testing of chemical products. A laboratory for fourth year students with accommodation for eight workers has been fitted up. Each of these laboratories has its own balance room adjoining furnished with instruments from the best makers and adapted to the particular objects in view.

In addition there are rooms set apart for gas analysis, electrolytic analysis and a specially constructed fireproof laboratory for combustion, crucible and bomb furnaces. A calorimeter room has been equipped in the basement. Each of these laboratories is supplied with apparatus of the most approved design, providing excellent facilities for the prosecution of work in analytical and technical chemistry.

A start has been made in equipping in a room in the basement, set apart for the purpose, a laboratory for carrying on chemical operations on a small factory scale.

### ELECTROCHEMICAL LABORATORIES

The Electrochemical laboratories, which are situated in the Chemistry and Mining building, are provided with special facilities for electrolytic work, including a large storage battery and electroplating dynamo with tanks as well as a good set of apparatus and electrical measuring instruments. The experimental work on electric furnaces is carried out in a large furnace room in the basement, occupied jointly by this Department and the Department of Metallurgy. The equipment for this purpose comprises a 120 KW, 110 volt generator supplying direct current through a switchboard, rheostats, circuit-breaker and instruments to a set of distributing bus-bars, and a 200 KV-a transformer stepping down from 2200 volts to 30-120 volts in 3 and 6 volt steps, which supplies alternating current at 25 cycles. There is a complete set of A.C. instruments, circuit-breakers, oil-switches, relays, automatic regulating winches, etc., and a Northrup high frequency furnace with its transformer is also installed.

### ASSAYING LABORATORIES

These are situated in the west end of the basement in the Mining Building. They consist of five rooms, in addition to a library for study and an instructor's room. The East laboratory, 17 x 47 feet, and the West laboratory, 28 x 37 feet, are equipped with coal, oil and gas furnaces of various design. Each room has a fume cupboard, and the necessary equipment for the wet work in connection with assaying. Accommodation for twenty-four students at a time is provided, by individual work desks, each supplied with a balance, weights, fluxes, tools, drawers and lockers.

Common to both laboratories is the balance room which has a cement table on brick piers to support the bead balances. These are illustrative of the types met in practice. Adjoining the West laboratory is a research room. A store-room adjoins the East laboratory where fluxes, clay ware and extra parts are kept. In the instructor's room are stored a large number of ores and bullion, obtained chiefly from typical mining districts and metallurgical plants, for class use. The preparation of ores is done in the Milling building, where crushers, pulverizers and sampling devices are available. A special laboratory sampler has been constructed for the purpose of giving samples for the student's assays, of indisputable similarity, thus confining variations in results to the students' work. Other apparatus includes Guess-Haultain stationary electrolytic outfits, King rotating electrolytic apparatus, microscopes, optical resistance and thermocouple pyrometers, hand and foot cupel machines, grinding plates and screens.

### MINING AND ORE DRESSING LABORATORY

A detached building 72 ft. x 70 ft. contains the Mining and Ore dressing equipment. It is heated, lighted and supplied with power from the central plant. It is divided into several parts, the larger being 72 ft x 53 ft. by 22 ft. high.

In this room is a 5-stamp battery with amalgamation plates, Wilfley table, Deister Plat-o table, Deister slime table, baffle, and classifiers of sufficient size to make tests on lots of from one to ten tons.

In addition are a set of small Wilfley tables, two 3-compartment jigs, a 2 ft. x 3 ft. tube mill, a small experimental tube mill, agitators, small classifiers and other testing apparatus for experimenting on the falling rates of ore particles, slime settling, surface tension and flotation processes. These include a Case machine, a K. and K. machine, a Ruth machine, a Callow cell, etc. Water is supplied from a tank in the roof. The machinery is all motor driven:

One portion of the room is devoted to rock drills of various types and other mining apparatus.

The other part of the building, 72 ft. x 17 ft., is divided into several rooms and contains a Hadfield's Gyratory Crusher, 16 in. x 12 in. Rolls, small crushers, screening machine, and sampling apparatus. The crushers are driven by a 30 h.p. motor in another room.

The other rooms contain a Wetherill magnetic separator, screen sets, a smelting equipment, workshop and storage for small lots of ore. The larger part of the ore supply is accommodated in bins outside the building.

The plant throughout is intended mainly for teaching and experimental purposes.

### METALLURGICAL LABORATORY

This laboratory, in the East end of the Mining building, occupies about 3,600 sq. ft. on the basement floor and the same space immediately above on the ground floor. A stairway connects the two floors. The basement floor is divided into one large furnace room, a small hydrometallurgical room and two store-rooms. The furnace room contains a motor driven Connersville blower, several gas fired furnaces, two small blast furnaces, and a small 6 hearth Wedge roasting furnace. The larger electric furnaces of the Department of Electrochemistry are in this room. Some are supplied with direct current, others with A.C. from a 200 K.V.A. transformer. A system of flues, with hoods over all the furnaces, leads through a Cottrell precipitator of the Rathbun type taking current at 50,000 volts, to a stack through which gases are pulled by a fan in the attic.

The hydro-metallurgical room in addition to apparatus for leaching tests contains several natural draft furnaces, a large Hoskins resistance furnace. There are also tanks for electrolytic refining and precipitation of metals.

The upper floor is divided into laboratories, store rooms and offices. The laboratories are: 1. Metallurgical analysis; 2. Heating treatment and pyrometry; 3. Grinding, polishing and etching; 4. Metallographic room with an adjoining dark room.

In the laboratory for metallurgical analysis the student is given some training in mill and smelter methods of analysis. It is well equipped for this work.

In the heat treatment and pyrometry laboratory are a number of tube furnaces of different sizes, a Leeds & Northrup transformation point indicator with furnace, double thermocouple and twin galvanometer, a Leeds & Northrup potentiometer pyrometer, a disappearing filament pyrometer, and many thermocouples for use with galvanometer or potentiometer. For grinding and polishing there is provided two motor driven emery wheels and a set of 3 motor driven horizontal polishing plates.

The metallographic room is equipped with one horizontal photo micrographic instrument made by Pellin Paris, one vertical photo micrographic apparatus by Bausch & Lomb and two other Bausch & Lomb metallographic microscopes.

There is also a Pellin instrument for the determination of critical points by photography according to the Saladin method.

### MECHANICS OF MATERIALS LABORATORY

This laboratory is intended for the scientific and commercial testing of materials of construction such as iron, steel, timber, concrete and masonry.

It is supplied with the following:

An Emery 50-ton hydraulic machine, built by Wm. Sellers & Co., of Philadelphia, for making tests in tension and compression.

A 100-ton screw power machine, built by Riehle Bros., Philadelphia. It is designed for making tests in tension, compression, shearing and cross-

breaking, and will take in posts 12 feet long and beams up to 18 feet in length.

A Riehle 10-ton screw power universal testing machine.

A Riehle 50-ton screw power universal testing machine.

A Riehle 50-ton hydraulic testing machine intended especially for testing concrete blocks.

A Riehle standard brick rattler.

A 15-ton single lever-machine, built by J. Buckton & Co., Leeds, England.

A torsion machine, built by Tinius Olsen & Co., Philadelphia, for testing the strength and elasticity of shafting. This machine will twist shafts up to 16 feet in length and 2 inches in diameter.

A hand power torsion machine of simple mechanical construction, specially designed for the testing of short shafts of a maximum diameter of one inch.

A Riehle transverse testing machine of 5,000 pounds capacity, adapted to specimens up to 48 inches in length.

A Riehle compressometer, with spherical seat attachment for the adjustment of specimens having slightly non-parallel faces. This compressometer will receive specimens up to 10 inches in length.

An Olsen compression micrometer of standard type.

A 20,000 pound Olsen, hand power, wire testing machine, specially fitted for testing wooden columns with both fixed and pivoted ends.

An Olsen combined impact tension and cantilever type testing machine.

An Olsen, 20,000 pound, hand power testing machine especially adapted for testing long columns.

An Olsen, 200 pound capacity, textile testing machine.

A Riehle abrasion cylinder, built to the standard required by the National Brickmaker's Association, adopted in 1901.

A Berry strain-gauge for spans of 3 inches and 8 inches.

A Nalder dividing engine. This may be used either for the precise division of scales or for the calibration of instruments intended for refined measurements.

A Brinell hardness testing machine.

A Shore scleroscope for testing hardness.

A large number of extensometers of the usual degree of precision. These include the Bauschinger, Martens, Unwin, Ames, Riehle, Johnson, Henning (recording) and other types. In addition there are the usual scales, micrometers, telescopes and reflectors, voltmeters for the determination of metallic contact, and such other appliances as are necessary in the making of precise measurements.

The shop is equipped with a number of high-class machine tools specially fitted for reducing the specimens to the requisite shapes and dimensions with a minimum of hand labour. It is also supplied with the necessary appliances for making ordinary repairs and for making apparatus for special experiment and original investigation.

## HIGHWAY LABORATORY

### ROAD METALS

This laboratory is equipped for carrying out investigations in the various materials employed in highway construction and maintenance, and comprises the following:

- Page impact machine for testing the toughness of road materials.
- Diamond core drill for preparing specimens for the toughness test.
- Deval abrasion machine for testing the resistance to wear of road materials.
- Cementation testing apparatus (Page type) for determining cementing properties of road materials.
- Jaw crusher (Mitchell type) for crushing rock for various tests.
- Power driven agitator with sieves for the mechanical analysis of sand, gravel and crushed rock.
- Dorry hardness testing machine for determining the hardness of rock used in road construction.

### BITUMENS

This laboratory is designed for the investigation of the physical rather than the chemical properties of bitumens used in road construction and maintenance. The equipment consists of an extractor for separating bitumens and aggregates, an Engler viscosimeter, a penetration apparatus as well as appliances for determining melting point, volatilization, specific gravity, ductility, etc.

## LABORATORY OF ONTARIO BOARD OF HEALTH

Through the courtesy of the Secretary of the Provincial Board of Health for Ontario the facilities of the excellently equipped laboratory which the Board maintains at Stanley Park have, with certain conditions, been placed at the service of the University for the investigation of problems of interest to the sanitarian and the sanitary engineer. The equipment consists of various types of sewage sedimentation tank, sewage filter, sewage measuring devices, aerators, sterilizing appliances and a complete and representative plant intended for the filtration and sterilization of water by practically all known methods.

## CEMENT TESTING LABORATORY

This laboratory is fitted with all the ordinary moulds, sieves, balances burettes, steaming and drying tanks, tables, and other appliances necessary in making the usual physical tests of a Portland cement. It is also supplied with completely equipped cabinets for individual work. In addition there are the following:

- A 2,000 lb. Riehle shot machine for tension.
- A 2,000 lb. Fairbanks shot machine for tension.

A 1,000 lb. Olsen automatic shot machine fitted for tests in either tension or cross breaking.

An Olsen soapstone moist closet of modern design.

### METROLOGICAL LABORATORY

The department of surveying and geodesy is provided with all the ordinary field instruments, such as transits, levels, compasses, micrometers, sextants, planimeters, plane tables, tapes, chains, etc., with which is carried on the instruction in practical field operations as detailed elsewhere.

A small laboratory is also established in the basement of the observatory described below, containing the necessary instruments for the refined measurements of geodetic surveying; as, a standard yard and metre, a Rogers 10-foot comparator, an invar base measuring apparatus, a Kater's pendulum with vacuum chamber, a level trier, micrometer microscopes, etc.

The geodetic observatory in connection with this department is used for the instruction of students of the Fourth Year in taking observations for time, latitude, longitude, and azimuth by the precise methods used in connection with a geodetic survey. It contains a 10-inch theodolite and zenith telescope by Troughton & Simms; an astronomical transit instrument and an 8-inch theodolite by Cooke; two electro-chronographs; a Howard astronomical clock; a Dent sidereal clock; a Dent sidereal break-circuit chronometer; a wireless receiving instrument; arithmometers, etc.

### GEOLOGICAL AND MINERALOGICAL LABORATORIES

In the Chemistry and Mining building on College Street the University possesses a modern laboratory for Geology and Mineralogy.

Courses are given in laboratory work, especially in personal examination of type sets of rocks, fossils, minerals and crystal models. These laboratory exercises serve to illustrate the introductory didactic instruction.

For the encouragement of pure crystallography the laboratories are supplied with goniometers of the various types, crystal models, appliances for the cutting of oriented crystal sections and for the physical examination of the same. Practical petrography is carried on in rooms provided with type sets of rocks, both macroscopic and microscopic. Advanced students are taught to make thin sections of rocks and fossils and to study them microscopically. For students in Mining a laboratory course in the interpretation of geological maps and sections is provided. Typical mining regions are studied in detail and an opportunity is afforded for the examination of specimens illustrating economic geology.

The laboratory for the preparation of thin sections of rocks, minerals and fossils is provided with electric diamond saws and grinding appliances for the various types of work incidental to the preparation of thin sections and museum material.

A room is also provided for advanced work in cartography and geological surveying.

The departments possess 28 petrological microscopes and 5 of other types, so that it is now possible to provide advanced students with instruments and sets of thin sections for their own especial use. The blowpipe laboratory contains 156 lockers, especially designed for apparatus for students. Provision is made for the study of opaque minerals in reflected light.

### LIBRARY

The University Library is contained in a building of its own, situated on the east side of the campus, that lies to the south of the Main Building. All students who have paid a library fee to the Bursar of the University are entitled to the privileges of the Library. Besides Reading Rooms the Building contains Departmental Studies, which may be used as study-rooms by honour students in the various branches and in which the Professors hold seminary courses, and private studies, intended for members of the Faculty or advanced students engaged in research work. The Library is opened at 8.45 every morning and remains open until 5.15 in the afternoon (6 p.m. during the second term). Books in ordinary use may not be taken out of the building during the daytime, but are lent for the night shortly before the hour of closing, to be returned the following morning before 10 o'clock. Books not in general demand may, on special application, be borrowed for a longer period. Failure to return a borrowed book at the proper time and other breaches of the regulations are punishable by fine or suspension from the privileges of the Library.

Rooms have been set apart in the Engineering, Mechanical, Chemistry and Mining and Electrical buildings for the housing of such periodicals and other literature of the University Library as is of special interest to the students of this faculty.

### ROYAL ONTARIO MUSEUM

#### ARCHAEOLOGY, GEOLOGY, MINERALOGY, PALAEONTOLOGY, ZOOLOGY

Students of the University in all departments are recommended to avail themselves of the privileges of the Museum, which, although under separate control, is intimately connected with the work of the University.

The Museum is open on all week days from 10 a.m. to 5 p.m., and on Sundays from 2 p.m. to 5 p.m. The admission is free to the public on Tuesday, Thursday, Saturday and Sunday. On other days an admission fee of fifteen cents is charged.

By a resolution of the Board of Trustees all regular students of the University may be admitted free on all days of the week by presenting their card of registration.

## UNIVERSITY OF TORONTO C.O.T.C.

The Toronto Contingent of the Canadian Officers Training Corps was organized in 1914, with a strength of 12 Companies. Its primary object is to provide students at Universities with a standardized measure of military training with a view to their qualifying for commissions in the country's auxiliary forces. C.O.T.C. Certificates of qualification exempt their holders from examination for commissioned rank on joining a militia unit. The facilities which are offered by the contingent for obtaining a qualification while at the University, are intended to enable gentlemen to give personal service to their country with the least possible interference with their civil careers, to ensure that units have their establishments complete in the junior commissioned ranks, and to build up an adequate reserve of scientifically trained officers who have completed a period of consecutive and systematic military training, on academic lines, of a nature calculated to produce good officers.

The contingent provides the practical work for students taking the Military Studies option for the B.A. degree, as also physical exercise for students who may choose this as the form in which they will take their compulsory Physical Training. In addition to service in the corps for a University credit, students of any year or Faculty are trained in it to qualify for officers' certificates, writing on the examinations set by the War Office for members of O.T.C. contingents throughout the Empire. As the corps develops, after the set-back subsequent to its continuous activities during the war, it is hoped that it may be possible to form companies according to faculties and to so arrange the training of each that on leaving the University students will be qualified for commissions in that branch of the Militia to which their University course particularly applied.

During session 1921-22 three companies were successfully reorganized—in Arts, Medicine and Applied Science respectively—and it is hoped so to arrange the training of each that on leaving the University students will be qualified for commissions in that branch of the Militia to which their University course particularly applied.

The C.O.T.C. is a unit of the non-permanent Active Militia but forms no part of the organization for war and cannot be called out for active service as such. It is a training centre for the educated youth of the country from whom, as from all its sons, the Empire requires hard service but the hardest from those to whom most has been given.

The present Headquarters are at 184 College Street, and include armouries, members' reading room, library, and lecture room.

The Contingent's Staff is:

*Officer Commanding.....Colonel W. R. Lang, late Gen. Staff, C.E.F.  
Second in Command.....Major T. R. Loudon, late Can. Eng., C.E.F.  
Adjutant.....Major H. H. Madill, late I.C., C.E.F.*

*Quartermaster* ..... Lieut. V. C. Kerrison, late C.A.S.C., C.E.F.  
*Paymaster* ..... Lieut. T. A. Reed  
*Muskeetry Officer* .....  
*Contingent Sergeant-Major* ... S.-M. W. Hunt, late Royal Welch Fusiliers.

Officers of "C" (Applied Science) Company:

*Officer Commanding* ..... Major J. R. Cockburn, M.C.  
*Second in Command* ..... Capt. W. J. T. Wright, M.B.E.  
*Subalterns* ..... Lieuts. J. D. Walks, H. W. McManus,  
J. F. Milne

## SOCIETIES

### THE ENGINEERING SOCIETY OF THE UNIVERSITY OF TORONTO

#### OFFICERS FOR 1922-1923

<i>President</i> .....	F. J. Lyle
<i>First Vice-President</i> .....	C. A. Norris
<i>Second Vice-President</i> .....	T. M. S. Kingston
<i>Treasurer</i> .....	M. E. McQuarrie
<i>Secretary</i> .....	J. W. Kennedy
<i>Curator</i> .....	W. R. Boake
<i>Fourth Year President</i> .....	R. G. Morrison
<i>Third Year President</i> .....	W. J. W. Reid
<i>Second Year President</i> .....	P. S. White
<i>First Year President</i> .....	C. A. Armour
<i>Civil Club Representative</i> .....	W. J. McLelland
<i>Mining and Metallurgical Club Representative</i> .....	W. S. Maguire
<i>Mechanical and Electrical Representative</i> .....	H. E. Wingfield
<i>Chemical Club Representative</i> .....	L. M. Price
<i>Architectural Club Representative</i> .....	A. S. Crawford
<i>Debating Club Representative</i> .....	A. V. Price
<i>Athletic Association Representative</i> .....	A. A. Bell

The Society meets every second Wednesday during the academic year (except April), beginning with the second Wednesday in October. Addresses are given by prominent men on subjects of general interest.

The Society is divided into six clubs for the purpose of affording a medium of study of matters relating in particular to different branches of Engineering. Each of the Clubs holds its meetings at regular intervals. Papers are read and discussions held on engineering subjects.

The Society publishes an annual, called "Transactions," which contains the addresses given at the meetings and an account of the year's activities.

A Supply Department is conducted by the Society on a co-operative plan, through which instruments, draughting supplies, stationery, etc., can be purchased at a low cost.

#### ATHLETIC ASSOCIATION

1922-1923

<i>Hon. President</i> .....	Prof. C. H. C. Wright
<i>President</i> .....	A. A. Bell
<i>Vice-President</i> .....	J. G. Cade
<i>Secretary-Treasurer</i> .....	K. V. Heyland
<i>Fourth Year Representative</i> .....	C. H. Lucas
<i>Third Year Representative</i> .....	H. F. Keebler
<i>Second Year Representative</i> .....	F. R. Dickenson
<i>First Year Representative</i> .....	W. A. Bentley

The Athletic Association has full control over all athletic clubs using the name of the Faculty of Applied Science. The Executive Committee has power to suspend any one from the privileges of membership in the Association for any breach of its regulations, and controls the finances of all athletic clubs in the aforesaid Faculty. The annual membership fee of this Association is one dollar.

No other moneys are collected for the support of athletics in the Faculty of Applied Science without the sanction of the Executive Committee.

### DEBATING CLUB

1922-1923

<i>Hon. Chairman</i> .....	Prof. E. A. Allcut
<i>Chairman</i> .....	A. V. Price
<i>Secretary-Treasurer</i> .....	S. L. Grenzebach
<i>Fourth Year Representative</i> .....	A. F. Murphy
<i>Third Year Representative</i> .....	G. H. Rowat
<i>Second Year Representative</i> .....	N. E. McPherson
<i>First Year Representative</i> .....	R. E. Knowles

### THE INDUSTRIAL CHEMICAL CLUB

OFFICERS FOR 1922-1923

<i>Hon. President</i> .....	Prof. J. W. Bain
<i>Hon. Vice-President</i> .....	Dr. M. C. Boswell
<i>Chairman</i> .....	L. M. Price
<i>Vice-Chairman</i> .....	H. N. Baker
<i>Secretary-Treasurer</i> .....	D. A. S. Lee
<i>Curator</i> .....	R. Hayward
<i>Fourth Year Representative</i> .....	H. F. Robertson
<i>Third Year Representative</i> .....	A. F. Stuart
<i>Second Year Representative</i> .....	A. Harrop
<i>First Year Representative</i> .....	S. Innes

The object of the Chemical Club is to promote the study of industrial chemistry and chemical engineering. Illustrated lectures, preceded by an informal dinner and a short musical programme, are held fortnightly, and on the following day an excursion is made to industrial concerns located in the city or vicinity.

MECHANICAL AND ELECTRICAL ENGINEERING CLUB  
1922-1923

<i>Hon. Chairman</i> .....	Prof. R. W. Angus
<i>Hon. Vice-Chairman</i> .....	Prof. H. W. Price
<i>Chairman</i> .....	H. E. Wingfield
<i>Vice-Chairman (Mechanical)</i> .....	J. Goldie
<i>Vice-Chairman (Electrical)</i> .....	J. Inglis
<i>Secretary-Treasurer</i> .....	W. A. Becker
<i>Third Year Representative</i> .....	H. J. Pugsley
<i>Second Year Representative</i> .....	R. E. Taylor
<i>First Year Representative</i> .....	H. P. Ruggle

The Club meets every Thursday during the academic year for the discussion of papers relating to mechanical and electrical engineering problems.

CIVIL ENGINEERING CLUB  
1922-1923

<i>Hon. Chairman</i> .....	Prof. C. R. Young
<i>Chairman</i> .....	W. J. McLelland
<i>Vice-Chairman</i> .....	W. H. Campbell
<i>Secretary-Treasurer</i> .....	E. C. Shurley
<i>Fourth Year Representative</i> .....	H. G. Clappison
<i>Third Year Representative</i> .....	A. R. Chadwick
<i>Second Year Representative</i> .....	W. R. Boake
<i>First Year Representative</i> .....	A. F. Hunter
<i>Varsity Representative</i> .....	F. B. Boswell

The Club is addressed during the academic year by practising engineers on modern methods and problems in civil engineering.

MINING AND METALLURGICAL CLUB  
1922-1923

<i>Hon. Chairman</i> .....	Prof. G. A. Guess
<i>Chairman</i> .....	W. S. Maguire
<i>Vice-Chairman and Fourth Year Representative</i> .....	G. C. Mutch
<i>Secretary-Treasurer and Third Year Representative</i> .....	A. G. Horning
<i>Second Year Representative</i> .....	W. Hansen
<i>First Year Representative</i> .....	J. S. Dickson
<i>Chairman Entertainment Committee</i> .....	J. G. Ironside

The Club is the official organization representing the undergraduates of Departments 2 and 8 of the Faculty of Applied Science.

The objects of the Club are to promote the spirit of good fellowship and mutual assistance amongst its members, both graduate and undergraduate, to provide a means of meeting together, and for the discussion of pertinent topics.

## ARCHITECTURAL CLUB

1922-1923

<i>Hon. Chairman</i> .....	Mr. J. P. Hynes (Pres. O.A.A.)
<i>Chairman</i> .....	A. Scott Crawford
<i>Vice-Chairman</i> .....	Miss J. M. Hall
<i>Secretary</i> .....	J. D. McLean
<i>Treasurer</i> .....	W. E. Carswell
<i>Fourth Year Representative</i> .....	H. A. McIntyre
<i>Third Year Representative</i> .....	W. P. Lawson
<i>Second Year Representative</i> .....	F. J. Wallis
<i>First Year Representative</i> .....	G. S. Screamton

## FACULTY OF APPLIED SCIENCE

## YOUNG MEN'S CHRISTIAN ASSOCIATION

The Y.M.C.A. of the Faculty of Applied Science was organized January 27th, 1905, and forms an integral part of the University of Toronto Y.M.C.A., which is a Federation of the Associations of the various Colleges and Faculties of the University. The object of the Association is to develop a true Christian manhood and to help the students in whatever way possible.

## OFFICERS FOR 1922-1923

<i>Hon. President</i> .....	Prof. R. W. Angus
<i>President</i> .....	J. C. Dumbille
<i>Vice-President</i> .....	J. Beattie
<i>Secretary-Treasurer</i> .....	T. H. Jenkins

## UNIVERSITY OF TORONTO STUDENTS' ADMINISTRATIVE COUNCIL, 1922-1923

## REPRESENTATIVES FROM ENGINEERING SOCIETY

<i>President Engineering Society</i> .....	F. J. Lyle
<i>Fourth Year Representative</i> .....	A. S. Murphy
<i>Third Year Representative</i> .....	W. J. W. Reid
<i>Second Year Representative</i> .....	P. S. White
<i>First Year Representative</i> .....	C. A. Armour

## LODGING AND BOARD

Accommodation is readily obtainable in numerous private boarding-houses within convenient distance of the University, at a cost of from twelve dollars a week upwards for comfortable lodging with board; or rooms may be rented at a cost from six dollars a week upwards, and board obtained separately at about seven dollars per week. A list of accredited boarding-houses is kept by the Secretary of the Students' Christian Association, and students are recommended to consult him with reference to the selection of suitable accommodation.

## UNIVERSITY RESIDENCES

By the generosity of Mr. and Mrs. E. C. Witney and other friends, the University can now offer to some hundred and fifty men the peculiar advantages of residential life and excellent accommodation within its own grounds. The Residence, opened in November, 1908, consists of three Houses situated on the north side of Hoskin Avenue, opening upon a quadrangle, the fourth side of which is formed by Devonshire Place. They stand about two hundred yards to the north of University College and close to Hart House. The buildings are known as the South, East and North Houses.

Each House contains twenty-four single rooms, one single suite, one double room and eleven suites, a suite comprising a study and two bedrooms. A large room in each building, with an open hearth has been set aside as a common room. A lavatory with hot and cold shower baths is provided for every eight men. The buildings are heated by steam and lighted by electricity.

The University supplies the table, chairs, book-case, chiffonier, bed, mattress, pillows, linen and window shades for each room; it is prepared to furnish a drop-light for a nominal rental.

The rates are \$4.00 per week for a single room or half of a suite, and \$5.00 per week for a single suite. The rental for the Michaelmas Term is payable in advance in one instalment, that for the Easter Term is payable in two instalments—\$50.00 at the opening of the term and the balance on April 1st. These charges cover heat, light, house-service, house-laundry, and the use of the telephone. There is no separate dining hall connected with the Residence, but board may be obtained at the adjacent University Dining Hall in Hart House.

Applications for rooms must be made in writing to the Secretary of the Residence Committee (address the Registrar's Office) and must be accompanied by a deposit of \$5.00. This deposit will be returned if the application be not granted, and will be forfeited if a room is assigned to the applicant and not taken by him, unless notice of his refusal of the room be received by the Secretary in writing before September 15th. It will be returned in full at the end of the College year if the room key be given

back and the room and furniture left in a satisfactory condition. The following principles govern the allotment of rooms: (i) No student who, as a result of the annual Spring examinations, is not assured of being able to proceed to a subsequent year, will be admitted into the Residence. Exception to this rule will be made in the case of a student in the Faculty of Medicine who has obtained standing at the May examination, but is debarred by the rules of that Faculty from proceeding to the subsequent year until he has passed his Supplemental examinations. Such a student will be assigned a room provisionally, but cannot occupy it unless he passes his Supplemental examinations in September. (ii) The rooms in each House will be distributed between the various Faculties and Years. (iii) A limited number of rooms will be reserved for members of the incoming First Year until September 12th. (iv) Applications will be considered in order of priority.

The University lays down three general rules, designed to prevent hazing, the use of intoxicants and gambling. The students in each House shall elect a House Committee, which is entrusted by the University with the making and enforcing of any other needed rules and with the maintenance of order. A member of the Faculty resides in each House to act as friend and adviser to the men in residence.

## SUMMARY OF STUDENTS REGISTERED

## SESSION 1922-1923

# UNIVERSITY OF TORONTO



## CALENDAR OF THE FACULTY OF APPLIED SCIENCE AND ENGINEERING 1924-1925



## CONTENTS

	PAGE
<b>CALENDAR.....</b>	<b>7</b>
<b>ADMINISTRATIVE OFFICERS OF UNIVERSITY.....</b>	<b>9</b>
<b>FACULTY LISTS.....</b>	<b>9</b>
<b>HISTORICAL SKETCH.....</b>	<b>16</b>
<b>MATRICULATION.....</b>	<b>17</b>
<b>ADMISSION</b>	
<b>GENERAL.....</b>	<b>18</b>
<i>Ad eundem statum.....</i>	<b>18</b>
<b>REGISTRATION.....</b>	<b>18</b>
<b>ENQUIRIES.....</b>	<b>18</b>
<b>BACHELOR'S DEGREES.....</b>	<b>19</b>
<b>OPTIONS.....</b>	<b>19</b>
<b>MASTER'S DEGREES.....</b>	<b>19, 103</b>
<b>PROFESSIONAL DEGREES.....</b>	<b>19, 104</b>
<b>FEES, DUES AND DEPOSITS.....</b>	<b>20</b>
<b>SCHOLARSHIPS.....</b>	<b>21</b>
<b>JUNIOR INSTRUCTORSHIPS.....</b>	<b>27</b>
<b>RESEARCH ASSISTANTSHIPS.....</b>	<b>27</b>
<b>REGULATIONS RESPECTING</b>	
<b>REGULAR EXAMINATIONS.....</b>	<b>27</b>
<b>TERM EXAMINATIONS.....</b>	<b>28</b>
<b>SUPPLEMENTAL EXAMINATIONS.....</b>	<b>28</b>
<b>VACATION NOTES.....</b>	<b>29</b>
<b>VACATION LETTERS.....</b>	<b>29</b>
<b>FIELD EXPERIENCE.....</b>	<b>29</b>
<b>SHOP WORK.....</b>	<b>30</b>
<b>TERM WORK.....</b>	<b>30</b>
<b>SUMMER SURVEY SESSION.....</b>	<b>31</b>
<b>DRAFTING ROOMS.....</b>	<b>31</b>
<b>THESSES.....</b>	<b>31</b>
<b>STUDENTS IN ATTENDANCE.....</b>	<b>32</b>
<b>EXEMPTIONS.....</b>	<b>32</b>
<b>GENERAL INFORMATION FOR STUDENTS.....</b>	<b>32</b>
<b>HART HOUSE.....</b>	<b>33</b>
<b>STUDENTS' ADMINISTRATIVE COUNCIL.....</b>	<b>35</b>
<b>ATHLETIC ASSOCIATION.....</b>	<b>35</b>
<b>PRESCRIPTION OF COURSES</b>	
<b>DEPARTMENT OF CIVIL ENGINEERING.....</b>	<b>37</b>
“          “ MINING ENGINEERING.....	42
“          “ MECHANICAL ENGINEERING.....	45
“          “ ARCHITECTURE.....	49

	PAGE
DEPARTMENT OF CHEMICAL ENGINEERING.....	52
"        " ELECTRICAL ENGINEERING.....	55
"        " METALLURGICAL ENGINEERING.....	58
<b>DESCRIPTION OF COURSES</b>	
APPLIED MECHANICS.....	60
ARCHITECTURE.....	64
ASSAYING, MINING AND ORE DRESSING.....	67
ASTRONOMY AND GEODESY.....	71
BIOLOGY.....	72
CHEMISTRY.....	72
ECONOMICS AND BUSINESS ADMINISTRATION.....	76
ELECTRICITY.....	79
ENGINEERING DRAWING AND DESCRIPTIVE GEOMETRY.....	82
ENGINEERING PHYSICS.....	85
GEOLOGY.....	86
HYDRAULICS.....	88
HEAT ENGINES.....	90
MACHINERY.....	93
MATHEMATICS.....	94
METALLURGY.....	95
MINERALOGY.....	97
MODERN LANGUAGES.....	98
PHYSICAL TRAINING.....	99
SURVEYING.....	99
ADDITIONAL FOURTH YEAR COURSES.....	101
THESIS.....	101
VACATION WORK.....	101
SCHOOL OF ENGINEERING RESEARCH.....	102
ADVANCED COURSE IN HYDRO-ELECTRIC POWER.....	102
SCHOOL OF GRADUATE STUDIES.....	102
MASTER'S DEGREES.....	19, 103
PROFESSIONAL DEGREES.....	19, 104
HIGH SCHOOL ASSISTANT'S CERTIFICATE.....	105
<b>LABORATORY EQUIPMENT</b>	
THERMODYNAMIC AND MECHANICAL LABORATORY.....	106
HYDRAULIC LABORATORY.....	107
AERODYNAMIC LABORATORY.....	108
ENGINEERING PHYSICS LABORATORIES.....	110
PHOTOGRAPHIC AND PROJECTION LABORATORIES.....	111
ELECTRICAL LABORATORIES.....	111
CHEMICAL LABORATORIES.....	112
ELECTROCHEMICAL LABORATORIES.....	113
ASSAYING LABORATORIES.....	113
MINING AND ORE DRESSING LABORATORY.....	114
METALLURGICAL LABORATORIES.....	114
MECHANICS OF MATERIALS LABORATORY.....	115
HIGHWAY LABORATORY.....	117

	PAGE
ONTARIO BOARD OF HEALTH LABORATORY.....	117
CEMENT TESTING LABORATORY.....	117
METROLOGICAL LABORATORY.....	118
GEOLOGICAL AND MINERALOGICAL LABORATORIES.....	118
LIBRARY.....	119
ROYAL ONTARIO MUSEUM.....	119
C.O.T.C.....	120
STUDENT SOCIETIES.....	122
LODGING AND BOARD, RESIDENCES.....	126
SUMMARY OF STUDENTS IN ATTENDANCE.....	127

1924

## CALENDAR

1924

JANUARY			FEBRUARY			MARCH			APRIL		
Sun. . . 6 13 20 27			Sun. . . 3 10 17 24			Sun. . . 2 9 16 23 30			Sun. . . 6 13 20 27		
Mon. . . 7 14 21 28			Mon. . . 4 11 18 25			Mon. . . 3 10 17 24 31			Mon. . . 7 14 21 28		
Tues. . . 1 8 15 22 29			Tues. . . 5 12 19 26			Tues. . . 4 11 18 25 ..			Tues. . . 8 15 22 29 ..		
Wed. . . 2 9 16 23 30			Wed. . . 6 13 20 27			Wed. . . 5 12 19 26 ..			Wed. . . 9 16 23 30 ..		
Thur. . . 3 10 17 24 31			Thur. . . 7 14 21 28			Thur. . . 6 13 20 27 ..			Thur. . . 10 17 24 ..		
Fri. . . 4 11 18 25 ..			Fri. . . 1 8 15 22 29			Fri. . . 7 14 21 28 ..			Fri. . . 11 18 25 ..		
Sat. . . 5 12 19 26 ..			Sat. . . 2 9 16 23 ..			Sat. . . 1 8 15 22 29 ..			Sat. . . 12 19 26 ..		
MAY			JUNE			JULY			AUGUST		
Sun. . . 4 11 18 25			Sun. . . 1 8 15 22 29			Sun. . . 6 13 20 27			Sun. . . 10 17 24 31		
Mon. . . 5 12 19 26			Mon. . . 2 9 16 23 30			Mon. . . 7 14 21 28			Mon. . . 11 18 25 ..		
Tues. . . 6 13 20 27			Tues. . . 3 10 17 24 ..			Tues. . . 8 15 22 29 ..			Tues. . . 12 19 26 ..		
Wed. . . 7 14 21 28			Wed. . . 4 11 18 25 ..			Wed. . . 9 16 23 30 ..			Wed. . . 13 20 27 ..		
Thur. . . 1 8 15 22 29			Thur. . . 5 12 19 26 ..			Thur. . . 10 17 24 31			Thur. . . 14 21 28 ..		
Fri. . . 2 9 16 23 30			Fri. . . 6 13 20 27 ..			Fri. . . 11 18 25 ..			Fri. . . 15 22 29 ..		
Sat. . . 3 10 17 24 31			Sat. . . 7 14 21 28 ..			Sat. . . 12 19 26 ..			Sat. . . 29 16 23 30 ..		
SEPTEMBER			OCTOBER			NOVEMBER			DECEMBER		
Sun. . . 7 14 21 28			Sun. . . 5 12 19 26			Sun. . . 2 9 16 23 30			Sun. . . 14 21 28		
Mon. . . 1 8 15 22 29			Mon. . . 6 13 20 27			Mon. . . 3 10 17 24 ..			Mon. . . 15 22 29		
Tues. . . 2 9 16 23 30			Tues. . . 7 14 21 28			Tues. . . 4 11 18 25 ..			Tues. . . 16 23 30		
Wed. . . 3 10 17 24 ..			Wed. . . 8 15 22 29 ..			Wed. . . 5 12 19 26 ..			Wed. . . 17 24 ..		
Thur. . . 4 11 18 25 ..			Thur. . . 9 16 23 30 ..			Thur. . . 6 13 20 27 ..			Thur. . . 18 25 ..		
Fri. . . 5 12 19 26 ..			Fri. . . 10 17 24 31 ..			Fri. . . 7 14 21 28 ..			Fri. . . 19 26 ..		
Sat. . . 6 13 20 27 ..			Sat. . . 4 11 18 25 ..			Sat. . . 1 8 15 22 29 ..			Sat. . . 20 27 ..		

1925

## CALENDAR

1925

JANUARY			FEBRUARY			MARCH			APRIL		
Sun. . . 4 11 18 25			Sun. . . 1 8 15 22			Sun. . . 1 8 15 22 29			Sun. . . 5 12 19 26		
Mon. . . 5 12 19 26			Mon. . . 2 9 16 23			Mon. . . 2 9 16 23 30			Mon. . . 13 20 27		
Tues. . . 6 13 20 27			Tues. . . 3 10 17 24			Tues. . . 3 10 17 24 31			Tues. . . 14 21 28		
Wed. . . 7 14 21 28			Wed. . . 4 11 18 25 ..			Wed. . . 4 11 18 25 ..			Wed. . . 15 22 29 ..		
Thur. . . 1 8 15 22 29			Thur. . . 5 12 19 26 ..			Thur. . . 5 12 19 26 ..			Thur. . . 16 23 30 ..		
Fri. . . 2 9 16 23 30			Fri. . . 6 13 20 27 ..			Fri. . . 6 13 20 27 ..			Fri. . . 17 24 ..		
Sat. . . 3 10 17 24 31			Sat. . . 7 14 21 28 ..			Sat. . . 7 14 21 28 ..			Sat. . . 11 18 25 ..		
MAY			JUNE			JULY			AUGUST		
Sun. . . 3 10 17 24 31			Sun. . . 7 14 21 28			Sun. . . 5 12 19 26			Sun. . . 9 16 23 30		
Mon. . . 4 11 18 25 ..			Mon. . . 8 15 22 29 ..			Mon. . . 13 20 27			Mon. . . 10 17 24 31		
Tues. . . 5 12 19 26 ..			Tues. . . 9 16 23 30 ..			Tues. . . 14 21 28 ..			Tues. . . 11 18 25 ..		
Wed. . . 6 13 20 27 ..			Wed. . . 10 17 24 ..			Wed. . . 15 22 29 ..			Wed. . . 12 19 26 ..		
Thur. . . 7 14 21 28 ..			Thur. . . 11 18 25 ..			Thur. . . 16 23 30 ..			Thur. . . 13 20 27 ..		
Fri. . . 8 15 22 29 ..			Fri. . . 12 19 26 ..			Fri. . . 17 24 ..			Fri. . . 10 17 24 ..		
Sat. . . 9 16 23 30 ..			Sat. . . 13 20 27 ..			Sat. . . 11 18 25 ..			Sat. . . 15 22 29 ..		
SEPTEMBER			OCTOBER			NOVEMBER			DECEMBER		
Sun. . . 6 13 20 27			Sun. . . 4 11 18 25			Sun. . . 1 8 15 22 29			Sun. . . 13 20 27		
Mon. . . 7 14 21 28			Mon. . . 5 12 19 26			Mon. . . 2 9 16 23 30			Mon. . . 14 21 28		
Tues. . . 8 15 22 29			Tues. . . 6 13 20 27			Tues. . . 3 10 17 24 ..			Tues. . . 15 22 29 ..		
Wed. . . 9 16 23 30			Wed. . . 7 14 21 28 ..			Wed. . . 4 11 18 25 ..			Wed. . . 16 23 30 ..		
Thur. . . 10 17 24 ..			Thur. . . 8 15 22 29 ..			Thur. . . 5 12 19 26 ..			Thur. . . 17 24 ..		
Fri. . . 11 18 25 ..			Fri. . . 9 16 23 30 ..			Fri. . . 6 13 20 27 ..			Fri. . . 18 25 ..		
Sat. . . 12 19 26 ..			Sat. . . 10 17 24 31			Sat. . . 7 14 21 28 ..			Sat. . . 19 26 ..		

CALENDAR OF THE FACULTY OF APPLIED SCIENCE  
AND ENGINEERING 1924-1925

MICHAELMAS TERM

- 1924—Aug. 16 Saturday....Students Third Year, Dept. 1, report at Summer Survey Camp.
- Aug. 23 Saturday....Students Third Year, Dept. 2, report at Summer Survey Camp.
- Sept. 2 Tuesday....Last day for receiving applications for supplemental examinations.
- Sept. 13 Saturday....Students Fourth Year, Astronomy Option, report at Summer Survey Camp.
- Sept. 24 Wednesday..Supplemental Examinations commence.
- Oct. 1 Wednesday..The opening address by the President to the students of all the Faculties at 3 p.m. in Convocation Hall.
- Registration in person of the first and second years.
- Oct. 2 Thursday....Registration in person of the third and fourth years.
- Oct. 3 Friday.....Lectures and Laboratory work commence at 9 a.m.
- Last day for handing in Vacation work.
- Meeting of Faculty Council.
- Oct. 4 Saturday....Stated meeting of the Caput to deal with requests as to social functions until November 15.
- Oct. 6 Monday.....Interyear Track Meet. Faculty buildings closed after 1 p.m.
- Oct. 8 Wednesday..Interfaculty Track Meet. University Buildings closed after 1 p.m.
- Oct. 10 Friday.....Meeting of Senate.
- Oct. 15 Wednesday..First meeting of Engineering Society.
- Oct. 29 Wednesday..Meeting of Engineering Society.
- Nov. 7 Friday.....Meeting of Faculty Council.
- Nov. 10 Monday.....Thanksgiving. University Buildings closed Saturday-Monday.
- Nov. 12 Wednesday..Meeting of Engineering Society.
- Nov. 14 Friday.....Meeting of Senate.
- Nov. 26 Wednesday..Meeting of Engineering Society.
- Dec. 1 Monday....Last day for receiving applications for supplemental examinations.
- Dec. 5 Friday.....Meeting of Senate.
- Dec. 12 Friday.....Meeting of Senate.
- Dec. 19 Friday.....Last day of lectures. Term ends at 5 p.m.

## EASTER TERM

- 1925—Jan. 3 Saturday.... Mid-session examinations commence.
- Jan. 7 Wednesday.. Lectures and Laboratory work commence at  
9 a.m.
- Last day for handing in IV Year Theses.
- Jan. 9 Friday..... Meeting of Faculty Council.  
Meeting of Senate.
- Jan. 14 Wednesday.. Meeting of Engineering Society.
- Jan. 28 Wednesday.. Meeting of Engineering Society.
- Feb. 6 Friday..... Meeting of Faculty Council.
- Feb. 11 Wednesday.. Meeting of Engineering Society.
- Feb. 13 Friday..... Meeting of Senate.
- Feb. 25 Wednesday.. Meeting of Engineering Society.
- Mar. 2 Monday..... Last day for receiving applications for  
supplemental examinations.
- Mar. 6 Friday..... Meeting of Faculty Council.  
Annual elections of Engineering Society.
- Mar. 13 Friday..... Meeting of Senate.
- Apr. 3 Friday..... Meeting of Faculty Council.
- Apr. 4 Saturday.... Second term ends. Lectures and Laboratory  
work end at 12 noon.
- Apr. 7 Tuesday.... Annual examination commence.
- Apr. 10 Friday..... Good Friday. University Buildings closed.
- Apr. 17 Friday..... Meeting of Senate.
- May 1 Friday..... Meeting of Faculty Council.
- May 8 Friday..... Meeting of Senate.
- May 25 Monday..... University Buildings closed.
- June 3 Wednesday.. Meeting of Senate.
- June 5 Friday..... University commencement.



10 UNIVERSITY OF TORONTO CALENDAR 1924-1925

J. R. COCKBURN, M.C., B.A.Sc., M.E.I.C., <i>Associate Professor of Descriptive Geometry.</i>	100 Walmer Road
S. R. CRERAR, B.A.Sc., D.L.S., <i>Assistant Professor of Surveying.</i>	122 Grenadier Road
F. C. DYER, B.A.Sc., M.E.I.C., <i>Assistant Professor of Mining Engineering.</i>	233 Ashworth Ave.
O. W. ELLIS, M.Sc. (Birmingham), A.M.I.C.E., <i>Assistant Professor of Metallurgical Engineering.</i>	539 Church St.
P. GILLESPIE, B.A.Sc., M.Sc. (McGill), C.E., M.E.I.C., <i>Professor of Civil Engineering.</i>	358 Davenport Rd. Oakville, Ont.
G. A. GUESS, M.A. (Queen's), <i>Professor of Metallurgical Engineering.</i>	
H. E. T. HAULTAIN, C.E., M.I.M.M. <i>Professor of Mining Engineering.</i>	156 Glencairn Ave.
J. T. KING, B.A.Sc., <i>Assistant Professor of Mining Engineering.</i>	126 Manor Road
A. T. LAING, B.A.Sc., <i>Associate Professor of Highway Engineering.</i>	146 Balmoral Ave.
T. R. LOUDON, B.A.Sc., M.E.I.C., <i>Associate Professor of Applied Mechanics.</i>	189 Sheldrake Blvd.
H. H. MADILL, B.A.Sc., M.R.A.I.C., <i>Assistant Professor of Architecture.</i>	Engineering Building
A. W. McCONNELL, B.A.Sc., M.R.A.I.C., <i>Associate Professor of Architecture.</i>	36 Prince Arthur Ave.
J. McGOWAN, B.A., B.A.Sc. <i>Professor of Applied Mechanics</i>	
J. H. PARKIN, B.A.Sc., M.E., F.R.A.E.S. <i>Assistant Professor of Mechanical Engineering.</i>	10 Columbine Ave.
H. W. PRICE, B.A.Sc., <i>Professor of Electrical Engineering.</i>	474 Palmerston Blvd.
T. R. ROSEBRUGH, M.A., <i>Professor of Electrical Engineering.</i>	92 Walmer Road
W. J. SMITHER, B.A.Sc., <i>Assistant Professor of Structural Engineering.</i>	Engineering Building
L. B. STEWART, D.T.S., <i>Professor of Surveying and Geodesy.</i>	17 Admiral Road
R. TAYLOR, B.A.Sc., <i>Assistant Professor of Mechanical Engineering</i>	Islington
W. M. TREADGOLD, B.A., <i>Associate Professor of Surveying.</i>	13 Woodlawn Ave. E.
C. H. C. WRIGHT, B.A.Sc., M.R.A.I.C., <i>Professor of Architecture.</i>	419 Markham St.
C. R. YOUNG, B.A.Sc., C.E., M.E.I.C., <i>Associate Professor of Structural Engineering.</i>	98 Hilton Ave.
A. R. ZIMMER, B.A.Sc., <i>Assistant Professor of Electrical Engineering.</i>	80 Pine Crest Road

## SESSIONAL APPOINTMENTS

E. B. ANDERSON, B.A.Sc., <i>Demonstrator in Thermodynamics.</i>	84 Macpherson Ave.
S. W. ARCHIBALD, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	489 Brunswick Ave.
E. R. ARTHUR, B.Arch. (Liverpool), A.R.I.B.A., <i>Lecturer in Architecture.</i>	Dept. of Arch.
S. G. BENNETT, M.C., B.A.Sc., <i>Lecturer in Commercial Engineering.</i>	121 Spadina Road
A. C. BLUE, B.A.Sc., <i>Demonstrator in Machine Design.</i>	487 St. Clarens Ave.
A. R. CLUTE, B.A., LL.B., <i>Special Lecturer in Limited Companies and Common Law.</i>	47 Elgin Ave.
FREDERICK COATES, A.R.C.A., <i>Instructor in Modelling.</i>	Scarborough Bluffs
J. J. CRAWFORD, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	85 Bloor St. East
W. A. DANCEY, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	23 Surrey Place
A. V. DE LAPORTE, B.A.Sc., <i>Instructor in Sanitary Engineering.</i>	189 Robert St.
W. L. DICKSON, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	76 Pinewood Ave.
F. P. DOWNEY, M.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	320 Robert St.
W. B. DUNBAR, B.A.Sc., <i>Instructor in Engineering Drawing.</i>	241 Glebeholme Blvd.
W. C. C. DUNCAN, B.A.Sc., <i>Lecturer in Electrical Engineering.</i>	196 Ellsworth Ave.
H. B. DUNINGTON-GRUBB, B.S.A. (Cornell), <i>Special Lecturer in Landscape Architecture.</i>	1158 Bay St.
W. S. FERGUSON, <i>Special Lecturer in Accountancy and Business.</i>	52 Tranby Ave.
H. J. FRANKLIN, B.A.Sc., <i>Instructor in Engineering Drawing.</i>	72 Delaware Ave.
W. J. GRANT, B.A.Sc., <i>Demonstrator in Chemical Engineering.</i>	83 Quebec Ave.
W. H. GREAVES, <i>Special Lecturer in Public Speaking.</i>	Aurora
W. S. GUEST, B.A.Sc., <i>Lecturer in Electrical Engineering.</i>	30 McMaster Ave.
A. E. HAMILTON, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	4 Grandview Ave.
U. C. HOLLAND, B.A.Sc., <i>Lecturer in Mechanical Engineering.</i>	1648 Dufferin St.

12 UNIVERSITY OF TORONTO CALENDAR 1924-1925

C. A. HUGHES, M.M., M.A.Sc., <i>Instructor in Applied Mechanics.</i>	Mimico Beach
K. B. JACKSON, B.A.Sc., <i>Instructor in Engineering Physics and Photography.</i>	South House, U. of T.
C. W. JEFFERY, M.O.S.A., <i>Instructor in Freehand Drawing.</i>	York Mills
P. V. JERMYN, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	Port Credit
R. P. JOHNSON, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	1531 Queen St. West
R. E. LAIDLAW, B.A.Sc., <i>Special Lecturer in Engineering Law.</i>	29A Shannon St.
G. H. W. LUCAS, Ph.D., <i>Lecturer in Chemical Engineering.</i>	122 Kendal Ave.
W. H. MACKLIN, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	345 Bloor St. West
R. H. McCABE, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	30 Ross St.
J. W. MELSON, B.A.Sc., <i>Lecturer in Surveying.</i>	69 Walmsley Blvd.
M. M. MONTEMURRO, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	11 Edgedale Rd.
H. B. PATTON, B.Sc. (McGill), <i>Demonstrator in Electrical Engineering.</i>	58 St. George St.
E. B. PHILLIP, B.A.Sc., <i>Demonstrator in Hydraulics.</i>	Islington
J. T. RANSOM, B.A.Sc., <i>Demonstrator in Engineering Physics and Photography.</i>	171 Arlington Ave.
J. W. REBECK, B.Sc. (British Columbia), M.A., <i>Demonstrator in Chemical Engineering.</i>	169 Avenue Rd.
C. C. ROUS, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	227 Cottingham St.
W. L. SAGAR, B.A.Sc., <i>Instructor in Applied Mechanics.</i>	Apt. 1, 114 Carlton St.
H. L. SEYMORE, B.A.Sc., C.E., <i>Special Lecturer in Town Planning.</i>	81 Victoria St.
J. E. B. SHORTT, B.A.Sc., <i>Demonstrator in Thermodynamics.</i>	401 Quebec Ave.
F. E. SIMPSON, <i>Assistant in Modelling.</i>	14 Lakeview Ave.
A. W. S. SMITH, B.Sc. (McGill), <i>Demonstrator in Electrical Engineering.</i>	27 Harbord St.
E. W. SMITHSON, B.A.Sc., <i>Demonstrator in Electrical Engineering.</i>	74 Evans Ave.
H. E. STEWART, B.A.Sc., <i>Demonstrator in Mining Engineering.</i>	5 Willcocks St.

FACULTY OF APPLIED SCIENCE AND ENGINEERING 13

J. E. TOOMER, B.S. (N. Carolina State), <i>Lecturer in Metallurgical Engineering.</i>	328 Brunswick Ave.
H. A. TUTTLE, B.A.Sc., <i>Lecturer in Mechanical Engineering.</i>	Hart House, U. of T.
J. J. WEICKER, B.A.Sc., <i>Demonstrator in Hydraulics.</i>	1449 Gerrard St. E.
A. C. WILSON, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	283 Evelyn Ave.
W. S. WILSON, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	1 Humewood Court
G. R. WORKMAN, B.A.Sc., <i>Demonstrator in Engineering Drawing.</i>	22 Helena Ave.
W. J. T. WRIGHT, M.B.E., B.A.Sc., <i>Lecturer in Engineering Drawing.</i>	126 Melrose Ave.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION TO  
STUDENTS IN APPLIED SCIENCE.

S. BEATTY, Ph.D., <i>Associate Professor of Mathematics.</i>	537 Markham St.
M. A. BUCHANAN, B.A., Ph.D., <i>Professor of Italian and Spanish.</i>	75 Heathdale Road
J. T. BURT-GERRANS, M.A., Phm.B., <i>Associate Professor of Electrochemistry.</i>	46 Dewson St.
J. H. CAMERON, M.A., <i>Professor of French.</i>	96 Admiral Road
C. A. CHANT, M.A., Ph.D., <i>Professor of Astro-Physics.</i>	201 Madison Ave.
A. T. DELURY, M.A., <i>Professor of Mathematics.</i>	74 St. Albans St.
B. FAIRLEY, M.A., Ph.D., <i>Associate Professor of German.</i>	22 Kendal Ave.
J. H. FAULL, B.A., Ph.D., <i>Professor of Botany.</i>	102 Yorkville Ave.
C. R. FAY, M.A., D.Sc., <i>Professor of History of Economics.</i>	88 St. George St.
J. G. FITZGERALD, M.B., <i>Professor of Hygiene and Preventive Medicine.</i>	186 Balmoral Ave.
D. T. FRASER, M.B., D.P.H., <i>Assistant Professor of Hygiene and Preventive Medicine.</i>	York Mills, Ont.
T. HEDMAN, Ph.D., <i>Assistant Professor of German.</i>	Old Forest Hill Road
F. B. KENRICK, M.A., Ph.D., <i>Professor of Chemistry.</i>	77 Lonsdale Road
W. J. LOUDON, B.A., <i>Professor of Mechanics.</i>	Cooksville, Ont.
J. W. MACARTHUR, M.A., Ph.D., <i>Assistant Professor of Genetics.</i>	319 Roehampton Ave.
M. A. MACKENZIE, M.A., <i>Professor of Mathematics.</i>	1 Bellwoods Park
A. MACLEAN, B.A., <i>Associate Professor of Geology.</i>	56 St. George St.
W. L. MILLER, B.A., Ph.D., <i>Professor of Physical Chemistry.</i>	8 Hawthorne Ave.
E. S. MOORE, M.A., Ph.D., <i>Professor of Economic Geology.</i>	53 Hewitt Ave.
G. H. NEEDLER, B.A., Ph.D., <i>Professor of German.</i>	103 Bedford Road

FACULTY OF APPLIED SCIENCE AND ENGINEERING 15

W. A. PARKS, B.A., Ph.D., <i>Professor of Geology.</i>	69 Albany Ave.
A. L. PARSONS, B.A., <i>Associate Professor of Mineralogy.</i>	72 Isabella St.
L. J. ROGERS, B.A.Sc., M.A., <i>Assistant Professor of Analytical Chemistry.</i>	29 Rosemount Ave.
H. B. SPEAKMAN, M.Sc., <i>Associate Professor of Zymology.</i>	61 Walmsley Blvd.
J. L. SYNGE, B.A., <i>Assistant Professor of Mathematics.</i>	183 Huron St.
J. E. THOMSON, B.A.Sc., <i>Assistant Professor of Mineralogy.</i>	20 Chestnut Park Road
T. L. WALKER, M.A., Ph.D., <i>Professor of Mineralogy.</i>	20 Avondale Ave.

SESSIONAL APPOINTMENTS.

L. A. BIBET, <i>Instructor in French.</i>	47 Cecil St.
W. G. BIRRELL, B.A.Sc., <i>Demonstrator in Electrochemistry.</i>	1254 Bloor St. W.
T. L. GLEDHILL, M.A., <i>Class Assistant in Geology.</i>	335 Brunswick Ave.
A. R. GORDON, M.A., <i>Demonstrator in Electrochemistry.</i>	40 Heath St. W.
H. W. HILBORN, B.A., <i>Lecturer in Italian and Spanish.</i>	58 Charles St. W.
G. E. HOLT, M.A., Mus.Bac., <i>Lecturer in German.</i>	280 Bloor St. West
G. R. HOOVER, B.A. <i>Assistant in Chemistry.</i>	40 College St. W.
S. F. KELLY, B.Sc. <i>Class Assistant in Geology.</i>	55 Charles St. W.
MISS J. C. LAING, B.A., <i>Instructor in French.</i>	39 MacFarland Ave.
R. R. McCLENAHAN, B.A., M.B., D.P.H., <i>Demonstrator in Hygiene.</i>	54A Summerhill Gardens
R. A. PROSSER, B.Sc. <i>Assistant in Chemistry.</i>	719 Spadina Ave.
H. C. RICKABY, B.A., <i>Demonstrator in Mineralogy.</i>	58 St. George St.
MISS M. E. G. WADDELL, M.A., <i>Tutor in Mathematics.</i>	32 Madison Ave.
A. E. R. WESTMAN, M.A., <i>Demonstrator in Electrochemistry.</i>	215 Indian Rd.
R. B. WALKER, B.A. <i>Assistant in Chemistry</i>	65 Clinton St.

## FACULTY OF APPLIED SCIENCE AND ENGINEERING.

### HISTORICAL SKETCH.

The Legislative Assembly of the Province of Ontario during the Session of 1877 gave its sanction to the establishment of a School of Practical Science on the basis proposed in the memorandum of the Minister of Education confirmed by the Lieutenant-Governor in Council on the 3rd day of February, 1877.

By the scheme thus approved the Government effected an arrangement with the Council of University College whereby the students of the School of Practical Science enjoyed full advantage of the instruction given by its professors and lecturers in all the departments of science which were embraced in the work of the School.

This arrangement was brought to an end in 1889 by the transfer of the department of science, above referred to, from University College to the University of Toronto under the operation of the University Federation Act.

In order that the students of the School might continue to enjoy the advantage of the instruction of the above departments, the Senate of the University of Toronto passed a Statute in October, 1889, affiliating the School to the University, which Statute was confirmed by the Lieutenant-Governor on the 30th day of October, 1889.

By an Order-in-Council, approved by the Lieutenant-Governor on the 6th day of November, 1889, a Principal was appointed, and the management of the School was entrusted to a council composed of the Principal as chairman, and the Professors, Lecturers and Demonstrators appointed on the Teaching Faculty of the School. By the terms of this order the management and discipline of the School was vested in the Council.

By the University Act of 1906 the School of Practical Science became the Faculty of Applied Science and Engineering of the University of Toronto, although on December 14th, 1900, the Senate by Statute, subsequently approved by the Lieutenant-Governor in Council, established a Faculty of Applied Science and Engineering but without assuming any liability for its support or maintenance. Under this Statute the teaching Staff and Examiners of the School of Practical Science became the teaching Staff and Examiners of the Faculty, although the University retained the right to appoint the Examiners for the Bachelor of Applied Science and professional degrees.

On April 8th, 1892, the Senate of the University established the Degree of B.A.Sc., which was open to those who held the Diploma of the School and were prepared to devote a fourth year to advanced work. In the Session 1909-1910 a new Course extending over four years and leading to the Degree of B.A.Sc. came into operation, taking the place of the long established Diploma Course of three years, which came to an end in the Session 1910-1911.

### MATRICULATION.

A candidate for admission to the First Year in the Faculty of Applied Science and Engineering must produce satisfactory certificates of good character and of having completed the seventeenth year of his age on or before the first of October of the year in which he proposes to register.

He must also present certificates giving him credit in the following subjects of Pass and Honour Matriculation:

#### PASS MATRICULATION

**ENGLISH** (Literature and Composition)

**HISTORY** (British and Ancient)

**MATHEMATICS** (Algebra and Geometry)

Any three of:

**LATIN** (Authors and Composition)

**GREEK** (Authors and Composition)

**FRENCH** (Authors and Composition)

**GERMAN** (Authors and Composition)

{ **SPANISH** (Authors and Composition) or

{ **ITALIAN** (Authors and Composition)

{ **EXPERIMENTAL SCIENCE** (Physics and Chemistry) or

{ **AGRICULTURE** (Parts I and II)

#### HONOUR MATRICULATION

(At least 50%)

**ENGLISH** (Literature and Composition).

**MATHEMATICS** (Algebra, Geometry and Trigonometry).

One of:

**LATIN** (Authors and Composition).

**GREEK** (Authors and Composition).

**FRENCH** (Authors and Composition).

**GERMAN** (Authors and Composition).

**SPANISH** (Authors and Composition).

**ITALIAN** (Authors and Composition).

In selecting the options it is recommended that students take French, German and Experimental Science. In the Department of Architecture, French is required, in the Departments of Chemical Engineering and Mechanical Engineering it is desirable that students take German. For students intending to take Metallurgical Engineering, Spanish and Experimental Science are recommended.

The regulations respecting Matriculation, together with a schedule of examinations which may be accepted as equivalent, may be found in the Curriculum for Matriculation on application to the Registrar of the University.

## ADMISSION.

Applications for admission must be made on blank forms supplied by the Registrar, and should be forwarded as early as possible to the Registrar of the University, together with all Pass and Honour Matriculation or equivalent certificates.

Applications based upon certificates other than those mentioned will be considered as occasion may require. Such certificates must be accompanied by an official statement of the marks in the various subjects upon which the certificate was granted.

ADMISSION. *AD EUNDEM STATUM*

An undergraduate of another University may be admitted *ad eundem statum* on such conditions as the Senate on the recommendation of the Council of the Faculty may prescribe.

An applicant for admission *ad eundem statum* must submit with his petition (1) a calendar of his University giving a full statement of the courses of instruction; (2) an official certificate of character and academic standing.

## REGISTRATION

Students in any year will be required to register in person on the date specified in the Calendar for the registration of students in that year. Those who present themselves on subsequent days must petition the Council to be allowed to register. Council reserves the right to reject applications of, or impose penalties upon, those who fail to report on the dates specified.

## ENQUIRIES.

Enquiries with reference to requirements of admission to the Faculty of Applied Science and Engineering are to be addressed to the Registrar of the University.

Communications relating to curricula, instruction, examinations and standing therein, in the Faculty of Applied Science and Engineering are to be addressed to the Secretary of the Faculty.

## DEGREES

*Degree of Bachelor of Applied Science (B.A.Sc.).**Degree of Bachelor of Architecture (B.Arch.).*

There are six graduating Departments leading to the Degree of Bachelor of Applied Science (B.A.Sc.) and one graduating Department leading to the Degree of Bachelor of Architecture (B.Arch.), viz.,

1. Civil Engineering.
2. Mining Engineering.
3. Mechanical Engineering.
4. Architecture.
5. (Discontinued.)
6. Chemical Engineering.
7. Electrical Engineering.
8. Metallurgical Engineering.

Descriptions of the courses in these Graduating Departments are given on pages 36, 37, 42, 45, 49, 52, 55, 58.

In the fourth year, optional courses are arranged in certain departments. Students are required to submit their selection to the Secretary in writing, not later than September 15th. The proposed selection must be approved by Council before adoption.

*Degree of Master of Applied Science (M.A.Sc.).**Degree of Master of Architecture (M.Arch.).*

Graduates holding the Degree of B.A.Sc. of this University or those holding the degree of another University recognized as equivalent, may take post-graduate work proceeding to the Degree of Master of Applied Science (M.A.Sc.). (For requirements, see page 103.)

Graduates holding the Degree of B.Arch. or B.A.Sc. in Architecture of this University, or those holding the Degree of another University recognized as equivalent, may take post-graduate work proceeding to the Degree of Master of Architecture (M.Arch.). (For requirements, see p. 103.)

*Professional Degrees.*

Graduates in Applied Science and Engineering, and graduates of the School of Practical Science, may, after three years spent in professional work, present themselves for the degrees of Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem. E.), Metallurgical Engineer (Met. E.), as the case may be, subject to the rules and regulations established by the University. (See page 104.)

### FEES

All fees are payable at the Bursar's office between the hours 10 a.m. and 1 p.m. of each week day except Saturday (or may be remitted by mail).

The annual fees, including tuition, library, laboratory supplies and one annual examination for each year, shall be as follows:

If paid in full on or before November 5th.....	\$150.00
If paid by instalments.—	

First instalment, if paid on or before November 5th.....	75.00
--	-------

Second instalment, if paid on or before February 5th.....	78.00
---	-------

Repeating the year—If paid in full on or before November 5th..	75.00
--	-------

The above fees are payable in advance. After November 5th a penalty of \$1.00 per month will be imposed until the whole amount is paid. In the case of payment by instalments the same rule as to penalty will apply.

Students must have paid the fees due in the first term before proceeding to the work of the second term.

### GENERAL FEES

Matriculation, or registration of Matriculation.....	\$ 5.00
Supplemental examination.....	10.00
Admission <i>ad eundem statum</i> .....	10.00
Degree of B.A.Sc.....	10.00
Degree of B. Arch.....	10.00
Degree of M.A.Sc.....	25.00
Degree of M.Arch.....	25.00
Physical Training (see page 21).....	5.00
Supplemental Physical Training (see page 21).....	10.00
Hart House (see page 21).....	8.00
Students' Administrative Council (see page 21).....	3.00

### DUES AND DEPOSITS

(Payable to the Secretary of the Faculty at the time of registration.)

Engineering Society membership .....	\$2.00
Athletic Association membership .....	1.00
Annual deposit, Departments 1, 3, 4, 7 .....	3.00
Departments 2, 6, 8 .....	8.00

Charges for waste, neglect and breakage are to be met out of the deposit fee, the balance of which will be refunded to the student at the end of the session on application to the Secretary.

If the foregoing deposits do not cover the cost of breakage due to carelessness or neglect, the balance shall be paid by the student to the Secretary and in default of such payment the results of his examination will be withheld.

**HART HOUSE FEE**

Every male student in attendance, proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering, is required to pay to the Bursar before December 1st the annual fee of eight dollars for the maintenance of Hart House. If this fee is not paid by the above date a penalty of two dollars will be imposed, making the total fee ten dollars.

**STUDENTS' ADMINISTRATIVE COUNCIL FEE**

Every student in attendance, proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering, is required to pay to the Bursar at the time of the entry of his name with the Secretary the annual fee of three dollars for the support of the Students' Administrative Council.

**PHYSICAL TRAINING FEE**

Every male student in attendance proceeding to a Bachelor's Degree in the Faculty of Applied Science and Engineering is required to pay to the Bursar the annual Physical Training fee of \$5.00 at the opening of each session in which Physical Training is compulsory for that student.

A student who has failed to complete satisfactorily the course in Physical Training prescribed for the First Year will not be permitted to register in the Third Year; and the student who has failed to complete satisfactorily the course in Physical Training prescribed for the Second Year will not be permitted to register in the Fourth Year.

Every student who has neglected to complete satisfactorily the course in Physical Training of the First or Second Year, and who must take this work during the Second or Third Year respectively of his course, will be required to pay to the Bursar at the opening of the session a Supplemental Fee of \$10.00, in addition to the prescribed Physical Training fee.

**SCHOLARSHIPS****BOILER INSPECTION AND INSURANCE COMPANY SCHOLARSHIP**

The Boiler Inspection and Insurance Company of Canada offers a Scholarship in the Department of Mechanical Engineering of the value of \$150.00 to the student who obtains highest Honour Standing in the regular examinations of the third year.

The successful candidate will be expected to proceed to his fourth year during the session next following the date of the award.

The amount of the award will be credited by the Bursar to the fees of the fourth year of the successful candidate.

**ONTARIO ASSOCIATION OF ARCHITECTS' ARCHITECTURAL SCHOLARSHIP**

The Ontario Association of Architects offers a scholarship in the Department of Architecture of the value of \$100 to the student who has obtained the highest standard of general proficiency during the first year. This scholarship will be awarded annually in May, 1922 to 1926 inclusive.

**TORONTO ARCHITECTURAL GUILD MEDAL**

The Toronto Architectural Guild was the organization of local architects from which sprung the Ontario Association of Architects. When the new and wider association became firmly established, the Guild disbanded and handed over to a trustee board certain funds for the establishment of a Medal to be awarded in the Department of Architecture of the University of Toronto.

The Trustee Board, now that the fund has accumulated considerably, announces its intention of awarding this medal annually to a senior student showing outstanding ability in Architectural Design.

**HARVEY AGGETT MEMORIAL SCHOLARSHIP**

This scholarship was donated by Mr. J. T. Aggett, of Toronto, as a perpetual memorial to his son, the late Lieutenant Harvey Aggett, who enlisted in March, 1915, during his second year in this Faculty, and was killed in action at Passchendaele on 6th November, 1917.

This annual scholarship of the value of seventy-five dollars is to be awarded to a student of the second year in this Faculty who, obtaining honours and being one of the first three in his year by his standing at the annual examinations relative to the pass requirements in his department, has been adjudged highest of the three in general student activities and service in the University during his period of attendance.

**THE 1851 EXHIBITION SCIENCE RESEARCH SCHOLARSHIP**

The Royal Commissioners for the Exhibition of 1851, if satisfied with the qualifications of the candidates put forward, will each year allot three Science Research Scholarships to Canada. The University of Toronto has been invited to recommend annually one or more candidates in order of merit for these Scholarships.

1. Each candidate recommended must be a British subject and under twenty-six years of age, except under very special circumstances; he must be a bona fide student of Science of not less than three years' standing; he must also have completed a full University course and have spent at least one full academic year at this University prior to the date of recommendation.

2. Applications for these Scholarships must be made to the Registrar of the University not later than March 15th; the latest date on which the recommendation of the University of Toronto for Scholarships offered in 1925 can be received at the Office of the Commissioners is May 1st, 1925.

3. Each Scholarship is of the value of £250 per annum, payable quarterly in advance; on presenting to the Commissioners a satisfactory final report

at the expiration of his Scholarship the scholar will receive a grant of £25. A scholar who is not in a position to travel at his own expense, or for whom it is not possible to obtain free passage, may make application to the Commissioners for aid towards the payment of his fare from his University to his place of study. A Scholar will receive an additional annual allowance, not exceeding £30, towards the cost of University fees, if, in the opinion of the Commissioners, he is in need of such allowance.

4. The Scholarship will be tenable ordinarily for two years, and in cases of exceptional merit for three years. The continuation of a Scholarship for a second year will depend upon the satisfactory nature of the scholar's first year's work. Renewal for a third year will be granted only where it appears that the renewal is likely to result in work of scientific importance.

5. The scholar will be required to devote himself to research in some branch of pure science, or its practical applications.

6. A scholarship may be held, with the approval of the Commissioners, at any Institution at home or abroad, but a scholar will not be permitted, except under very special circumstances, to conduct his investigations in the country in which he has received his scientific education. After consultation with the Head of the Department in which he elects to study, the scholar will submit, for the approval of the Commissioners, his proposed subject of research.

7. Scholars will be required to furnish reports of their work at the end of each year of tenure of their scholarships.

8. Scholars will be required to devote their whole time to the objects of the scholarship, and will be forbidden to hold any position of emolument which carries with it a duty inconsistent with their obligation to the Commissioners. Scholars must in any case obtain the consent of the Commissioners before accepting any additional emoluments.

9. In case of misconduct on the part of a scholar the Commissioners may, at their absolute discretion, deprive him of his scholarship and all emoluments therefrom.

The regulations adopted by the Senate are as follows:—

The departments, students of which shall be eligible to be candidates, are:—1. Bacteriology; 2. Biochemistry; 3. Biology (Zoology); 4. Botany; 5. Chemistry; 6. Engineering (metallurgical); 7. Engineering (chemical); 8. Engineering (electrical); 9. Engineering (mechanical); 10. Engineering (civil); 11. Engineering (mining); 12. Forestry; 13. Geology; 14. Mineralogy; 15. Pathology; 16. Physics; 17. Physiology.

A student shall not be deemed to be ineligible because of his being on the teaching staff of the University, if he has not been in receipt of a salary of more than \$900 per annum and has not been on the teaching staff for more than two years from graduation.

A student shall be deemed to be eligible in the year in which he intends to graduate, but if nominated for the Scholarship his nomination shall

be subject to his being successful in passing his examination for his degree.

The nomination of the candidate or candidates shall be made by a Board composed of seven members appointed by the Senate, and the Board shall consist of the Chancellor, the President, the Reverend Dr. Bowles, the Honourable Mr. Justice Masten, the Honourable Mr. Justice Riddell and Dr. J. A. Worrell, and the Board shall have power to call to its aid as assessor any member of the teaching staff.

#### THE RHODES SCHOLARSHIP

The trustees of the late Mr. C. J. Rhodes have assigned one of the Rhodes Scholarships to the Province of Ontario.

This scholarship will hereafter be thrown into open competition in the Province, subject to the following conditions:—

1. Candidates must be British subjects, with at least five years' domicile in Canada, and unmarried. They must have passed their nineteenth, but not have passed their twenty-fifth birthday, on October 1st of the year for which they are elected.

2. Candidates must be at least in their Sophomore Year at some recognized degree-granting University or College of Canada, and (if elected) complete the work of that year before coming into residence at Oxford.

3. Candidates must elect whether they will apply for the Scholarship of the Province in which they have acquired any considerable part of their educational qualification, or for that of the Province in which they have their ordinary private domicile, home or residence. They must be prepared to appear before the Committee of Selection for the Province they select.

In each Province there will be a Committee of Selection, appointed by the Trustees, in whose hands the nomination will rest. The Secretary of the Committee of Selection for Ontario is Norman S. Macdonnell, Esq., Barrister, Sun Life Building, Toronto.

The Committees of Selection will be instructed to bear in mind the suggestions of Mr. Rhodes, who wished that, in the choice of his Scholars, regard should be had to literary and scholastic attainments, fondness for and success in outdoor sports, qualities of manhood, moral force of character, and leadership in school and college life.

Every candidate for a Scholarship is required to furnish to the Committee of Selection for his Province the following:—

- (a) A certificate of age.
- (b) A written statement from the President or Acting President of his College or University to the effect that his application as a suitable candidate is approved.
- (c) Certified evidence as to the courses of study pursued by the Scholar at his University, and as to his gradings in those courses. This evidence should be signed by the Registrar, or other responsible official, of his University.

- (d) A brief statement by himself of his athletic and general activities and interests at College, and of his proposed line of study at Oxford.
- (e) Not more than four testimonials from persons well acquainted with him.
- (f) References to four other responsible persons, whose addresses must be given in full, and of whom two at least must be professors under whom he has studied.

It is in the power of the Committee of Selection to summon to a personal interview such of the candidates as they find desirable to see, and, save under exceptional circumstances, no Scholar will be elected without such an interview. Where such an interview is dispensed with, a written statement of the reasons will be submitted to the Trustees.

The Scholarships are of the value of £300 a year, and are tenable for three years, subject to the continued approval of the College at Oxford of which the Scholar is a member. They will be paid quarterly. The first payment (£75) will be made at the beginning of the Scholar's first term at Oxford. No request for any earlier payment can be considered.

On account of the increased cost of living the Rhodes Trust is giving an additional bonus of £50 per annum until further notice.

Rhodes Scholar, graduate of this Faculty:—

W. J. Browne, B.A.Sc., 1919.

#### THE McCHARLES PRIZE

This prize was established in connection with the bequest of the late Æneas McCharles of Provincial Government bonds of the value of \$10,000, and is awarded on the following terms and conditions, namely, that the interest therefrom shall be given from time to time, but not necessarily every year, like the Nobel prizes in a small way: (1) To any Canadian from one end of the country to the other, and whether student or not, who invents or discovers any new and improved process for the treatment of Canadian ores or minerals of any kind, after such process has been proved to be of special merit on a practical scale; (2) Or for any important discovery, invention or device by any Canadian that will lessen the dangers and loss of life in connection with the use of electricity in supplying power and light; (3) Or for any marked public distinction achieved by any Canadian in scientific research in any useful practical line. The following conditions, as passed by the Board of Governors, determine the method of award:—

- (1) The title shall be the McCharles Prize.
- (2) The value of the prize shall be One Thousand Dollars (\$1,000.00) in money.
- (3) The term "Canadian" for the purpose of this award shall mean any person Canadian born who has not renounced British alliance; and for the purpose of the award in the first of the three cases provided for by the bequest, domicile in Canada shall be an essential condition.

(4) Every candidate for the prize shall be proposed as such in writing by some duly qualified person. A direct application for a prize shall not be considered.

(5) No prize shall be awarded to any discovery or invention unless the same shall have been proved to the satisfaction of the awarding body, to possess the special practical merit indicated by the terms of the bequest.

(6) The order of priority in which the three cases stand in the wording of the bequest shall be observed in making the award; that is, the award shall go *caeteris paribus* to the inventor of methods of smelting Canadian ores; and, failing such inventions, to the inventor of methods for lessening the dangers attendant upon the use of electricity; and only in the third event, if no inventors of sufficient merit in the field of metallurgy and electricity present themselves, to the inventor distinguished in the general field of useful scientific research.

(7) The first award was made in 1910.

(8) The composition of the awarding body shall be as follows:—

An expert in Mineralogy,

An expert in Electricity,

An expert in Physics,

and four other persons. All of the members of this body shall be nominated by the Board of Governors of the University of Toronto.

#### THE KHAKI UNIVERSITY AND Y.M.C.A. MEMORIAL SCHOLARSHIP FUND

The Khaki University and Y.M.C.A. Memorial Scholarship Fund was established by the Khaki University Committee. At the present time this fund is being used to make loans to returned-soldier students of the higher years. Applications for such loans should be made to the President of the University.

#### THE JARDINE MEMORIAL PRIZE FOR ENGLISH VERSE

1. This prize, of the value of \$100, shall be open to any regular undergraduate student who has been in actual attendance at the University during the academic year preceding the date of submission (November 1) or who graduated in the previous academic year.

2. The subject and metre of the poem shall be left to the choice of the competitor.

3. It is suggested that the length of the poem should be not less than 100 or more than 300 lines.

4. The poems shall be in the hands of the Registrar of the University by November 1st.

5. Each poem shall be signed with a pseudonym and the competitor's name shall be submitted to the Registrar in a sealed envelope on which the pseudonym shall be written.

6. With his or her name the competitor shall enclose a signed statement that the poem is absolutely his or her original work.

7. The competition shall be judged by a board of five examiners, consisting of the head of the Department of English in each of the four colleges, and of a fifth examiner to be chosen by these four.

8. The examiners shall have the power to withhold the award in any year if no poem which has been submitted for that year be found worthy of the prize.

Awarded in 1920 to H. D. Langford; 1921, E. W. McInnis; 1922, no award.

#### THE UBUKATA FUND

The S. Ubukata Fund of \$10,000, the gift of Mr. S. Ubukata, provides for the establishment of prizes, medals, scholarships and loans for which Japanese students of all faculties and colleges may be eligible. Information regarding the conditions of award may be obtained from the Registrar of the University.

#### HOLLINGER RESEARCH FELLOWSHIP

The Hollinger Consolidated Gold Mines, Limited, awarded a fellowship of \$1,200 for research in the Department of Mining Engineering for the session 1923-1924.

#### JUNIOR INSTRUCTORSHIPS

Provision is made for the sessional appointment in various departments of graduates as Fellows or Demonstrators, whose duties shall consist of aiding in the work of instruction under the direction of the department concerned.

Applications for appointment should be made in writing to the Secretary of the Faculty not later than September 1st.

#### RESEARCH ASSISTANTSHIPS

A number of research assistants in the School of Engineering Research are appointed annually on salary, in the various departments, to carry on the work of research under the direction of members of the staff. This work is accepted as partial fulfilment of the requirements for the degrees of M.A.Sc. and M.Arch. These research assistants are usually recent graduates and are chosen from among those who have displayed special capacity for investigational work in their undergraduate courses. Prospective applicants should consult with members of the staff as soon as possible after the annual examination.

### REGULATIONS RESPECTING EXAMINATIONS

#### REGULAR EXAMINATIONS

Promotions from one year to another are made on the results of the annual examinations. A student proceeding to a degree must pass all the examinations in the subjects of his course and at the periods arranged from time to time by the Council.

Candidates who fail in passing the annual examinations will be required to take again the whole course of instruction, both theoretical and practical, of the year in which they fail before presenting themselves a second time for examination. (This repetition includes vacation work.)

A student who in either term of the session fails to perform the work of his course in a manner satisfactory to the professors in charge, will not be allowed to present himself at the final examinations of the year.

In the second, third and fourth years annual examinations will be held at the beginning of the second term on all subjects completed during the first term.

No student will be allowed to write at any examination who has not paid all fees and dues for which he is liable at that time.

The pass marks required on written examinations is 40% and on practical examinations 60%.

Honours will be granted in each department to the students who obtain at least 50 per cent. in each subject, and 75 per cent. of the total number of marks allotted to the department at the annual examinations.

Honour Graduate standing will be granted to those who obtain honours in the final and in one previous year.

#### TERM EXAMINATIONS

Term examinations may be held in any subject and at any time at the discretion of the instructor or by order of the Council, and the results of such examination may, if the Council so decides, be incorporated with those of the annual examinations in the same subjects.

#### SUPPLEMENTAL EXAMINATIONS

A candidate who fails in one or two subjects at the Annual Examinations will be required to take supplemental examinations in such subjects, but no student will be allowed a supplemental examination in the laboratory work of the fourth year.

The supplemental written examinations will begin on the 24th day of September, 1924. Notice in writing of his intention of taking such examinations (including practical ones) must be received from the candidate by the Secretary of the Faculty, and the fee of \$10.00 received by the Bursar, not later than the first of September. Council reserves the right to reject applications of, or impose penalties upon, those failing to comply with these requirements. Arrangements will be made to conduct supplemental examinations at the Survey Camp for those students in attendance.

In the case where a candidate desires to write upon an annual examination as a supplemental, his application must be received by the Secretary, and his fee by the Bursar, for the January examinations not later than the first of December and for the April examinations not later than the first of March.

Where a candidate fails to pass a supplemental examination it will be counted as one of the two supplemental examinations which may be allowed him after the next annual examination.

No student will be permitted to take the work required for a laboratory supplemental examination at any time other than the regular time of the session.

#### VACATION NOTES

##### *All Departments*

Vacation notes must be handed to the Department of Engineering Drawing on or before the first day of the session.

Vacation notes must be on construction only, and contain not less than twenty, nor more than thirty pages of sketches. These sketches must be freehand pencil drawings with figured dimensions.

Notes must be made in standard note books approved of by the Faculty. Notes which have been taken during the session in connection with the work in drawing will not count as vacation work.

The minimum percentage of marks required for practical work must be made in the case of vacation notes. (See page 101.)

#### VACATION LETTERS

##### *Department of Mining Engineering*

THIRD YEAR STUDENTS:—Four letters to be written and mailed to the Professor of Mining Engineering, one each month, June, July, August and September; at least one letter must deal with a labour episode.

FOURTH YEAR STUDENTS:—The student may select either one of the following alternatives:—

- A. Four letters to be written and mailed, one each month, June, July, August and September; at least one letter to be on a labour episode: or
- B. One letter describing a labour episode to be written and mailed to the Professor of Mining Engineering not later than June 30th, and an article of suitable character and length for submitting to the Engineering Institute of Canada or the Canadian Mining Institute as a student's paper, to be written and mailed to the Professor of Mining Engineering not later than September 30th. (See page 70).

#### FIELD EXPERIENCE

##### *Department of Mining Engineering*

The following are the regulations governing field experience certificates:

A candidate for the degree in the Department of Mining Engineering will be required to present satisfactory evidence of having had at least six months' practical experience in work connected with mining, metallurgy or geology, for which he must have received regular wages.

The time may be spent on geological survey, in ore dressing, smelter or lixiviation works, in an assay office in the vicinity of mining or metallurgical works, on any work in or about a mine other than as an office man or clerk, or in prospecting. Not more than three months on geological surveys will be accepted, and prospecting will only count one-half (*i.e.*, four months' prospecting will be counted as two months) and must not be submitted for more than three of the six months.

In addition to the above, two months must be spent as office man or clerk.

Certificates must be made out, signed, countersigned and sent during the first term to the Secretary of the Faculty of Applied Science and Engineering, who will retain them.

#### SHOP WORK

##### *Departments of Mechanical and Electrical Engineering*

Students in Mechanical and in Electrical Engineering are not granted their degree until certificates have been submitted to the Council, and accepted as satisfactory, showing not less than 1,600 hours of mechanical experience in production under commercial conditions. Preferably the work undertaken should be in one of the manufacturing industries or trades with which the course is related. Certificates, on the standard form which may be procured from the Secretary, must be presented during the first term.

It is not desirable that a student in these courses should enter the engineering industries without having acquired some experience in mechanical production and it is therefore required that he obtain this experience under commercial conditions, so that he can appreciate shop conditions and limitations.

#### REGULATIONS RESPECTING TERM WORK

Students working in any laboratory must be governed by the regulations relating thereto as made known from time to time.

No laboratory reports or drawings may be removed from the laboratories without permission. The Council reserves the right to dispose of them as may be thought proper.

#### FIELD WORK

Field Work in Surveying of the First and Second Years will be taken on the University grounds, during the first term.

No field notes will be counted which have not been taken in the field and during the hours allotted to such work.

Students taking practical astronomy are required to take observations in the field for time, latitude and azimuth.

**DEPARTMENTAL EXCURSIONS TO POINTS OF INTEREST**

As a part of Laboratory Instruction excursions to points of technical interest, both in Toronto and elsewhere, are arranged by the staff. These excursions are treated as laboratory periods with the same requirements as to attendance and reports. The total transportation costs in any one year will probably not exceed Ten Dollars.

**SUMMER SURVEY SESSION**

Practical surveying of the Third Year will be taken previous to the opening of the fall term during the months of August and September at the University Survey Camp situated on the shore of Gull Lake, and about five miles from the Village of Minden (lot No. 9 in 13th Concession of the Township of Lutterworth). The camp may be reached by taking the train leaving Lindsay for Haliburton, and getting off at Gelert. Conveyances will be on hand to meet students and take them to the camp. Personal effects must be limited to sixty pounds in weight, which must include two pairs of blankets, or their equivalent; beds and mattresses only will be provided.

Students will report at the camp on the dates shown on page 7.

Students of the Fourth Year in Department 1 who are taking the Astronomy Option are required to spend two weeks at the camp, beginning about September 15th, after completing their Third Year.

A field course in Geology will be given students in Department 2 the last week of the session at the camp.

**DRAFTING ROOMS**

Drawings and briefs for same, that are required to be finished the first term of the session will not be counted unless finished in that term.

No drawings or briefs for same will be counted which have not been made in the drafting rooms, and during the hours allotted to such work.

**THESES**

In the Fourth Year each student is required to prepare a thesis on a subject approved by the Council. The title of the thesis must be sent to the Secretary of the Faculty for approval on or before November 1st, and the completed thesis must be handed in by noon of the first day of lectures of the second term and shall become the property of the University. The rules governing size, form, etc., may be obtained on application to the Secretary. (See also p. 101.)

The thesis of each student who works upon a research problem in his fourth year must deal with the subject of investigation. In such cases the theses must be handed in not later than one week prior to the close of the annual examinations.

## REGULATIONS RESPECTING STUDENTS IN ATTENDANCE

All interference on the part of any student with the personal liberty of another by arresting him, or summoning him to appear before any unauthorized tribunal of students, or otherwise subjecting him to any indignity or personal violence, is forbidden by the Caput.

A student who is under suspension, or who has been expelled from a College or from the University, will not be admitted to the University buildings or grounds.

The name of the University is not to be used in connection with a publication of any kind without the permission of the Caput.

No student will be enrolled in any year, or be allowed to continue in attendance, whose presence is deemed by the Council to be prejudicial to the interests of the University.

Students proceeding regularly to the degree are required to attend the courses of instruction and the examinations in all subjects prescribed for students of their respective standing, and no student will be permitted to remain in the University who persistently neglects academic work.

Unless special permission is granted by the Council, a student who, at the close of two sessions in the University, has failed to secure standing in his year, will not be permitted registration in the Faculty of Applied Science and Engineering.

The constitution of every University society or association of students in the Faculty of Applied Science and Engineering and all amendments to any such constitution must be submitted for approval to the Council of the Faculty. All programmes of such societies or associations must, before publication, receive the sanction of the Council of the Faculty through the Dean. Permission to invite any person not a member of the Staff of the University to preside at or address a meeting of any society or association must be similarly obtained.

## EXEMPTIONS

Applications for exemption from any of the regulations shall be made to the Council in writing and the particulars of the case fully stated.

A student shall submit to Council evidence of illness or other handicap which occurs during the session immediately after its occurrence: no petition for leniency on account of such incidents will be considered if received after the third day following the last day of examinations.

## GENERAL INFORMATION FOR STUDENTS

The Council of University College and the governing bodies of the federated universities and colleges, respectively, have disciplinary jurisdiction over and entire responsibility for the conduct of their students in respect of all matters arising or occurring in or upon their respective college buildings and grounds, including residences.

The councils of such of the faculties as have assigned for their separate use any building or buildings and grounds, including residences, have disciplinary jurisdiction over and entire responsibility for the conduct of all students in their respective faculties in respect of all matters arising or occurring in or upon such building, or buildings and grounds.

In all such cases, and, save as aforesaid, as respects all students to what-so ever college or faculty they may belong, disciplinary jurisdiction is vested in the Caput, but the Caput may delegate its authority in any particular case or by any general regulation to the council or other governing body of the university or college or faculty to which the student belongs.

The Caput has also power and authority to determine by general regulations, or otherwise, to what college, faculty or other body the control of university associations belongs.

If there be any questions as to the proper body to exercise jurisdiction in any matter of discipline which may arise, the same shall be determined by the Caput, whose decision shall be final.

Disciplinary jurisdiction includes the power to impose fines.

Information as to the text-books, instruments and materials to be purchased by the students will be given on registration at the beginning of the session.

### HART HOUSE

Hart House, the gift of the Massey Foundation, is so called in memory of Mr. Hart Massey. In its widest interpretation it seeks to provide for all the activities in the undergraduate's life apart from the actual work in the lecture room. It affords all the facilities of a first-rate club. In the beauty of its architecture and the various functions which it performs it is unique on this continent.

Hart House contains completely equipped club rooms, including common rooms, reading room, music room, lecture room, sketch room, photographic dark rooms, the Great Hall, used as a dining hall, a small chapel, rooms reserved for religious organizations in the University, gymnasium, squash courts, swimming pool, running track, rifle range, billiard room, library and Hart House Theatre.

Hart House is open from 8.00 a.m. to 11.15 p.m. daily and meals are served in the Great Hall throughout the academic year. Members are entitled to full privileges of all rooms in the building between these hours and the use of the gymnasium, pool, showers and locker rooms until 6.30 p.m. each day, except Sunday, subject to the regulations of the Athletic Association.

The Library contains a good selection of books of general interest. These books must not be taken from the room.

Music recitals given by the leading musicians in the city take place in the Music Room throughout the year.

The Sketch Room is equipped with all facilities for drawing and painting, and weekly lectures and drawing classes are arranged.

A group of rooms is set apart for the use of the Faculty Union. A dining room and a common room are also reserved for Graduate Members. Five guest rooms are available for the use of guests, for periods of a week or less, at a reasonable charge.

The Warden is entrusted with the general supervision of the whole house in co-operation with the following committees: House, Hall, Library, Music, Billiard, Sketch, Camera and Squash. These committees consist of two senior members, the Warden and a full representation of undergraduates. The undergraduates are elected annually by their fellow students. The Board of Stewards is the Senior Committee and has final control of the House, being directly responsible to the Board of Governors. It consists of the Warden (*ex officio* chairman) and representatives of the President of the University, the Board of Governors, the Faculty Union, the Athletic Association, the Graduate Members, the University Y.M.C.A., the Students' Administrative Council and the undergraduate secretaries of all Standing Committees.

Hart House Theatre is an Art Theatre in the University, existing to promote the interests of dramatic art in the widest sense. The theatre is operated by a Board of Syndics, who are responsible to the Governors of the University for its administration. It has always been the policy of the Syndics to encourage the use of the theatre by those recognized dramatic societies within the University which are endeavouring to do serious work. When it is possible to do so, without interfering with the legitimate activities of the Theatre, the Syndics will be glad to allow its use by other student organizations.

All male undergraduates proceeding to a degree in the University are members of Hart House. The annual fee of \$8.00 covers all fees in connection with Hart House and membership in the Athletic Association for the academic year (September to May). Membership Cards may be obtained at the Warden's Office on presentation of the Bursar's receipt for fees paid.

Hart House has no endowment whatsoever and is entirely dependent for its upkeep on the fees received from graduates and undergraduates and from various sources of revenue in the House itself.

Other male students in the University, or students in the affiliated or federated institutions receiving instruction in the University, may become members of Hart House on payment of the required fee at the Warden's office. Should the students of any of these institutions elect to join Hart House in a body the \$8.00 fee still obtains but for individual membership the fee is \$10.00.

Graduates are entitled to the full privileges of Hart House on payment of an annual fee of \$10.00. Out-of-town graduates may become members on payment of an annual fee of \$2.50.

### STUDENTS' ADMINISTRATIVE COUNCIL

The Students' Administrative Council has been entrusted by the Caput with supervision of the conduct of the students, and has power subject to the approval of the Caput to deal with violations of the regulations governing conduct.

Any student who may be convicted of having taken part in a parade or procession through the city which has not been authorized by the police authorities after application by the Executive of the Students' Administrative Council, will be severely disciplined.

### UNIVERSITY OF TORONTO ATHLETIC ASSOCIATION

This organization has full control of the Athletic activities of the University undergraduates.

The Athletic Directorate is the executive of this association and is composed of two representatives from the teaching staff, five from the undergraduates and two from the graduates.

The regulations of the A.A.U. of C. require that every student who wishes to participate in athletic contests with outside clubs during the academic session must obtain a permit from the University Athletic Association.

## THE GRADUATING DEPARTMENTS

The instruction in the various departments leading through the four years to the degrees of B.A.Sc. and B.Arch. is designed to give the student a thorough grounding in the fundamentals of the engineering and architectural professions, and in addition a sufficient familiarity with applications of the principles to make him immediately useful upon graduation.

With the exception of Architecture and Chemical Engineering the various courses are very similar in the first year. The succeeding years are devoted to the more particular work of the departments. In the fourth year specialization develops to the extent of various options.

The graduating courses are so designed, with many subjects common to the departments of the several years, that the student upon graduation will find himself sufficiently equipped in the various fundamentals to pursue readily his studies in branches other than the one in which he has graduated and indeed to be useful in them as well. The courses in this Faculty are not planned to make specialists; the process of specialization is more properly deferred until after graduation.

In the teaching of the fundamentals, instruction is not confined wholly to applied science. As the future engineer is vitally concerned with the development of the country, it is essential that he be instructed as well in certain fundamentals in economics, administration and business which, in conjunction with his scientific training, will enable him to develop his full value.

In some departments laboratory work in the fourth year consists of an investigation of some specific problem. In all cases the student's knowledge of the original literature and primary sources of information is extended, and he is given a very desirable and useful training in methods of research. In this way the undergraduate course is linked with the graduate course (see p. 102) and with the work of the School of Engineering Research (see p. 102).

On the following pages the courses of instruction in the different departments are set forth in detail. The time devoted to lectures and practical work is indicated as accurately as possible, but is subject to modification from time to time as occasion may require.

For further information concerning the opportunities available for graduates of this Faculty, reference should be made to the pamphlet issued by the Director of Extension Work and Publicity of the University entitled "Opportunities for Graduates in Applied Science."

## 1. DEPARTMENT OF CIVIL ENGINEERING

The course in Civil Engineering is designed to meet the needs of the students who intend to take up such work as Geodetic Surveying, Railway Engineering, Municipal Engineering, Sanitary Engineering, Highway Engineering, Structural Engineering, Hydraulic Engineering, and administrative work in connection with both Engineering and Industrial undertakings.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Optics.....	185	1	2	1	2
Technical English.....	122 (a)	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing.....	166	0	11	0	18
Physical Training.....	...	0	2	0	2

### SECOND YEAR

Subject	No.	Hours per week			
		First Team		Second Term	
Lect.	Lab'y	Lect.	Lab'y		
Vacation Work.....	286	...	..	..	..
Calculus.....	237	1	0	1	0
Spherical Trigonometry.....	239	1	0	0	0
Elementary Astronomy.....	71	1	0	1	0
Descriptive Geometry.....	162	1	0	1	0
Surveying.....	272, 273	1	9	1	0
Dynamics.....	3	1	0	1	0

## CIVIL ENGINEERING—SECOND YEAR—Cont.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	0	0
Inorganic Chemistry A.....	87A	1	0	0	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Geology.....	195	0	0	2	0
Mineralogy.....	257,259	2	1	0	2
Hydrostatics.....	186	0	0	1	1
Heat.....	187	1	1½	0	0
Photography.....	188	1	1½	0	1½
Economics & Finance.....	123	1	0	1	0
Chemical Laboratory.....	89	0	3	0	3
Engineering Drawing.....	169	0	4½	0	13½
Physical Training.....	...	0	2	...	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Survey Camp.....	275	...	...	...	...
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	6	2	0	2	0
Thermodynamics.....	223, 224	1	0	1	2
Hydraulics.....	205, 206	2	0	2	3
Least Squares.....	240	0	0	1	0
Practical Astronomy and Geodesy.....	72, 73	2	2	2	0
Descriptive Geometry.....	164	1	0	0	0
Surveying and Levelling...	274	1	0	1	0
Electricity.....	143, 144	1	3	1	0
Stress Graphics.....	10	1	0	1	0
Cements and Concrete....	11	0	0	1	0
Engineering Geology.....	197	1	0	1	0
Commercial Law.....	124	1	0	1	0
Public Speaking.....	133	1	0	0	0
Mechanics of Materials Laboratory.....	9	0	3	0	0
Engineering Drawing.....	173	0	12	0	15

## CIVIL ENGINEERING—FOURTH YEAR

## (a) Astronomy Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Survey Camp.....	275	..	..	..	..
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Astronomy.....	74, 76	2	23	2	0
Geodesy.....	75, 76	2	0	2	23
Photographic Surveying.	191	1	2	0	0

## FOURTH YEAR

## (b) Municipal Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Hydraulics.....	211	1	3	0	0
Structural Design.....	17	1	0	0	0
Structural Design Draw- ing.....	179	0	0	0	5
Miscellaneous Structures	19	0	0	1	0
Hygiene and Bacteri- ology.....	82	1	0	1	6
Biology.....	81	0	5	0	0
Sanitary Chemistry....	117	1	6	0	4
Sanitary Engineering....	280	1	3	1	6
Highway Engineering...	281	1	3	1	3
Municipal Seminar (in- cluding Town Plan- ning).....	282	0	3	0	3
Municipal Administra- tion (including Civics)	132	1	0	1	0

## CIVIL ENGINEERING—FOURTH YEAR—(c) Structural Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
Physical Metallurgy....	252	1	0	1	0
Structural Design.....	17, 18	2	0	1	0
Miscellaneous Structures	19	0	0	1	0
Mechanics of Materials Laboratory.....	13	0	3	0	6
Structural Design Draw- ing.....	178	0	22	0	22

## FOURTH YEAR—(d) Hydraulic Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
Hydraulics.....	207, 208, 209	3	10	3	10
Physical Metallurgy....	252	1	0	1	0
Structural Design.....	17, 18	2	0	1	0
Miscellaneous Structures	19	0	0	1	0
Electrical Laboratory...	144	0	0	0	3
Mechanics of Materials Laboratory.....	13	0	6	0	3
Structural Design Draw- ing.....	179	0	4	0	8

## CIVIL ENGINEERING—FOURTH YEAR

## (e) Railway Engineering Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	3	0	0
Engineering Economics..	125	0	0	1	0
Engineering Law.....	126	1	0	0	0
Contracts and Specifica- tions.....	127	0	0	1	0
Management.....	128	1	0	0	0
Reinforced Concrete.....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Theory of Structures....	12	2	0	2	0
Hydraulics.....	211	1	3	0	0
Special Geology.....	204	0	0	1	1½
Physical Metallurgy.....	252	1	0	1	0
Electrical Laboratory... .	144	0	0	0	3
Motive Power.....	225	1	0	1	0
Railway and Miscellane- ous Structures.....	20, 19	1	0	1	0
Railway Economics.....	131	2	0	2	0
Railway Location and Design.....	276	1	8	1	6
Mechanics of Materials Laboratory.....	13	0	3	0	6
Structural Design Draw- ing.....	179	0	6	0	6

## 2. DEPARTMENT OF MINING ENGINEERING

The course in Mining Engineering, which originated in 1878 as a course in Assaying and Mining Geology, is intended to serve as a preliminary training for those who expect to practice in some branch of Mining Engineering, such as exploration of mining areas and primary development, mine surveying, mining processes involving civil, mechanical, and electric work of underground workings, mining machinery and operation; milling and treatment of ores, assaying and other forms of analysis and research, and administrative work in connection with both Engineering and Industrial undertakings.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Mineralogy.....	255, 258	2	1	0	3
Technical English.....	122 (a)	1	0	1	0
Business.....	121	0	0	1	0
Mining Laboratory.....	50	0	0	0	3
Engineering Drawing.....	166	0	11	0	14
Physical Training.....		0	2	0	2

## MINING ENGINEERING—SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Notes.....	286	..	..	..	..
Descriptive Geometry.....	162	1	0	1	0
Surveying.....	272, 273	1	6	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Inorganic Chemistry A.....	87A	1	0	0	0
Inorganic Chemistry B.....	87B	0	0	1	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Geology.....	195	0	0	2	0
Mineralogy.....	260, 261	1	2	1	2
Mining.....	51	1	3	0	0
Theory of Measurements..	65	1	0	0	0
Steam Engines.....	216	0	0	1	0
Theory of Mechanism.....	230	2	0	2	0
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	89, 90	0	6	0	6
Engineering Drawing.....	169	0	3	0	12
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Letters.....	68	..	..	..	..
Survey Camp.....	275	..	..	..	..
Geological Field Work.....	193	..	..	..	..
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	7	2	0	0	0
Hydraulics.....	205	2	0	2	0
Analytical Chemistry.....	88	1	0	1	0
Electricity.....	143	1	0	1	0
Assaying.....	45, 46	1	3	0	3
Economic Geology.....	202, 203	1	0	3	2
Dynamic and Structural Geology.....	198	1	0	0	0
Ore Dressing.....	58, 59	1	3	1	3
Physics of Ore Dressing.....	64	1	0	1	0
Mining.....	54	1	0	1	0
Petrography.....	262	1	0	1	0
Metallurgy.....	243	1	0	1	0

## MINING ENGINEERING—THIRD YEAR—Cont.

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Physical Metallurgy.....	244	0	0	2	0
Commercial Law.....	124	1	0	1	0
Petrography Laboratory ..	263	0	2	0	2
Introductory Research....	66	0	0	0	3
Chemical Laboratory .....	99	0	3	0	6
Mechanics of Materials					
Laboratory.....	9	0	0	0	3
Engineering Drawing.....	174	0	9	0	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Letters.....	68	..	..	..	..
Thesis.....	67	0	7	0	10
Mine Cost Keeping and					
Management.....	56	1	0	1	0
Thermodynamics.....	223	1	0	1	0
Assaying.....	47, 48	0	0	1	3
Electrochemistry.....	107, 108	2	3	0	0
Geology, Pleistocene					
and Physiographic .....	194, 201	1	1	1	0
Geology, Precambrian.....	199	2	0	0	0
Geology, Mining.....	200	0	0	2	0
Metallurgy.....	247	1	0	1	6
Mining.....	55	1	0	1	0
Ore Dressing.....	60, 61	1	6	1	0
Business.....		1	0	1	0
Metallography.....	251	0	0	0	3
Power	Electrical Lab'y...	144	0	3	0
	Hydraulics Lab'y..	210	0	0	3
	Thermodynamics				
	Lab'y.....	224	0	3	0

### 3. DEPARTMENT OF MECHANICAL ENGINEERING

The course in Mechanical Engineering is intended to serve as a preliminary training for those who intend to take up work connected with the design, manufacture, installation, or operation of machinery for the use of power as generated by steam, gas, oil, and water, and machinery and methods for the production, transportation, and handling of material, heating, ventilation, refrigeration, compressing of air, pumping of water, and all problems of a mechanical nature, and administrative work in connection with both Engineering and Industrial undertakings.

#### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry....	238	1	0	2	0
Descriptive Geometry....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry..	85	2	0	1	0
Electricity.....	135	2	0	2	0
Illuminating Engineering	185	1	2	1	2
Technical English.....	122 (a)	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing....	166	0	11	0	18
Physical Training.....		0	2	0	2

## MECHANICAL ENGINEERING—SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286	0	0	0	0
Calculus.....	237	1	0	1	0
Descriptive Geometry.....	162	1	0	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials..	4	2	0	2	0
Engineering Chemistry..	93	1	0	0	0
Inorganic Chemistry A..	87A	1	0	0	0
Organic Chemistry.....	95	0	0	1	0
Metallurgy.....	241	0	0	1	0
Hydrostatics.....	186	0	0	1	1½
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Steam Engines.....	216	1	0	1	0
Theory of Mechanism..	230	2	1½	2	1½
Economics and Finance..	123	1	0	1	0
Chemical Laboratory....	89	0	3	0	3
Engineering Drawing....	170	0	13	0	11
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Theory of Structures....	7	2	0	0	0
Thermodynamics.....	217, 219	2	3	2	3
Hydraulics.....	205, 206	2	0	2	3
Heat Engines.....	218	2	0	2	0
Mechanics of Machinery..	231	1	0	1	0
Machine Design.....	233	2	4	2	10
Magnetism Electricity..	138, 140	2	3	0	0
Alternating Current .....	139, 140	1	0	1	3
Physical Metallurgy.....	244	0	0	2	0
Compound Stress.....	10 (a)	1	0	0	0
Commercial Law.....	124	1	0	1	0
Mechanics of Materials					
Laboratory.....	9	0	0	0	3
Engineering Drawing....	177	0	9	0	0

## MECHANICAL ENGINEERING—FOURTH YEAR

## (a) Power Plant Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	0	0	0
Engineering Economics..	125	0	0	1	0
Structural Design.....	17, 18, 180	2	3	0	3
Electrical Laboratory....	144	0	0	0	3
Heat Treatment of Iron and Steel.....	253	1	0	1	0
Machine Design.....	235	2	7	1	6
Thermodynamics and Heat Engines.....	220, 221, 222	3	9	3	9
Hydraulics.....	207, 208, 209	3	8	3	8

## FOURTH YEAR

## (b) Water Power Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	0	0	0
Engineering Economics..	125	0	0	1	0
Structural Design.....	17, 18, 180	2	3	0	3
Electrical Laboratory....	144	0	0	0	3
Heat Treatment of Iron and Steel.....	253	1	0	1	0
Machine Design.....	235	2	5	1	7
Hydraulics.....	207, 208, 209	3	11	3	11
Mechanics of Materials..	13	0	6	0	3
Reinforced Concrete....	15	1	0	1	0
Foundations.....	14	1	0	1	0
Reinforced Concrete Design.....	181	0	3	0	3

## MECHANICAL ENGINEERING—FOURTH YEAR

## (c) Industrial Option

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	0	0	0
Engineering Economics..	125	0	0	1	0
Structural Design.....	17, 18, 180	2	3	0	3
Electrical Laboratory....	144	0	0	0	3
Heat Treatment of Iron and Steel.....	253	1	0	1	0
Heating, Ventilation and Refrigeration.....	226, 227, 228	1	3	1	3
Machine Design.....	235	2	6	1	8
Thermodynamics and Heat Engines.....	220, 221, 222	3	6	3	12
Hydraulics.....	209, 212	1	9	1	0
Industrial Management..	130	1	0	1	0

#### 4. DEPARTMENT OF ARCHITECTURE

The instruction in this department is arranged mainly to lay a broad foundation for the subsequent professional life of its graduates. The curriculum is based on the belief that an architect should have an education in liberal studies, that he should understand and appreciate the other arts in their relation to architecture, and that his training in design should teach him to regard building construction as an expression of his art rather than as an end in itself. With this object in view, the course in Architecture, which was originally derived from the Engineering courses, has been gradually broadened out to include an elementary training in the sister arts of painting and sculpture, and also courses in French and English.

#### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry....	238	1	0	2	0
Descriptive Geometry...	161	1	0	1	0
Statics.....	1	2	0	2	0
Building Measurements..	37	1	7	1	0
Elements of Architecture	28	1	0	1	0
History of Architecture..	25	1	3	1	0
Technical English.....	122(a)	1	0	1	0
French.....	266	2	0	2	0
Modelling.....	36	0	2	0	2
Freehand Drawing.....	35	0	3	0	2
Architectural Drawing...	167	0	9	0	18
Physical Training.....		0	2	0	2

## ARCHITECTURE—SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	285				
Descriptive Geometry...	163	1	0	1	0
Mechanics of Materials..	5	2	0	2	0
Architectural Design....	31	1	0	1	0
History of Architecture..	26	1	0	1	0
History of Ornament....	29	1	0	1	0
Illumination.....	189	1	1½	1	1½
Economics and Finance..	123	1	0	1	0
Technical English .....	122(b)	2	0	2	0
French.....	266	1	0	1	0
Modelling.....	36a	0	2	0	2
Freehand Drawing.....	35a	0	3	0	3
Architectural Design }	171	0	17	0	17
Architectural Drawing }		0	2	0	2
Physical Training.....					

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Structural Design.....	16	2	0	2	0
Acoustics .....	190	1	1½	1	0
Building Materials.....	38	2	0	2	0
History of Architecture..	27	1	0	1	0
History of Fine Art.....	30	1	0	1	0
Architectural Design....	32	1	0	1	0
Commercial Law.....	124	1	0	1	0
French.....	266	1	0	1	0
Modelling.....	36b	0	2	0	2
Water Colour Painting..	35b	0	3	0	3
Architectural Design }	175	0	18	0	18
Architectural Drawing }					

## ARCHITECTURE—FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	286	0	3	0	3
Contracts and Specifica- tions.....	127	0	0	1	0
Structural Design.....	16	1	3	1	3
Heating and Ventilating.....	40	1	0	1	0
Sanitary Science.....	39	1	0	1	0
Drawing from Life.....	35c	0	3	0	3
Modelling from Life.....	36c	0	2	0	2
AND ONE OF:					
Architectural Design..	33	2	24	2	22
Architectural Engineer- ing .....	34, 16	4	22	3	20

## 6. DEPARTMENT OF CHEMICAL ENGINEERING

The course is designed to give the student a thorough training in Chemistry and its application to industry, as well as a general knowledge of the elements of thermodynamics, hydraulics, machine design, structural design, electricity and metallurgy. A preliminary training of this nature with subsequent practical experience will enable him to undertake the design and construction and also the operation and management of the plant required in such branches of chemical industry as are concerned with the production of chemical and pharmaceutical products, rubber goods, leather and glue, soap, meat products, food-stuffs, oils of all kinds, sugar, pulp and paper, illuminating gas, coal tar and wood distillates, paints and varnishes, explosives, dyes, glass, portland cement, metals and their alloys, electrochemical products, fermentation products, printers' inks, fertilizers, ceramic and building materials, etc.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Optics.....	185	1	2	1	2
Technical English.....	122(a)	1	0	1	0
German.....	267	1	0	1	0
Business.....	121	0	0	1	0
Mineralogy Laboratory.....	256	0	0	0	3
Biological Laboratory.....	80	0	3	0	3
Chemical Laboratory.....	86	0	10	0	10
Engineering Drawing.....	168	0	4	0	4
Physical Training.....		0	2	0	2

## CHEMICAL ENGINEERING—SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Mechanics of Materials....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	0	0
Organic Chemistry.....	96	2	0	2	0
Metallurgy.....	241	0	0	1	0
Hydrostatics.....	186	0	0	1	1
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Industrial Chemistry.....	94	1	0	1	0
Physical Chemistry.....	98	2	0	2	0
Inorganic Chemistry A.....	87A	1	0	0	0
Inorganic Chemistry B.....	87B	0	0	1	0
German.....	267	1	0	1	0
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	92	0	10	0	12
Engineering Drawing.....	172	0	7	0	3
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry.....	102	1	0	1	0
Theory of Structures.....	7	2	0	0	0
Thermodynamics.....	217, 224	2	2	2	0
Hydraulics.....	205, 206	2	0	2	1
Metallurgy.....	243	1	0	1	0
Physical Metallurgy.....	244	0	0	2	0
Assaying.....	49	0	0	0	3
Analytical Chemistry.....	88	1	0	1	0
Electrochemistry.....	107, 108	2	3	0	0
Industrial Chemistry.....	103	1	0	1	0
Organic Chemistry.....	106	2	0	2	0
Chemical Plant.....	104	1	0	1	0
German.....	267	1	0	1	0
Commercial Law.....	124	1	0	1	0
Power.....	144, 206	0	3	0	3
Chemical Laboratory.....	100	0	7	0	13
Engineering Drawing.....	177	0	6	0	0
Electrical Laboratory.....	144	0	0	0	3

## CHEMICAL ENGINEERING—FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Industrial Management....	130	1	0	1	0
Machine Design.....	234	1	0	1	3
German.....	267	1	0	1	0
<i>or</i> Spanish.....	268	1	0	1	0
Inorganic Chemistry.....	109	2	0	2	0
Organic Chemistry.....	110	1	0	1	0
AND ONE OF:					
Electrochemistry.....	114, 115	2	*	2	*
Industrial Chemistry....	112, 113	1	*	1	*
Sanitary and Forensic Chemistry and Bac- teriology.....	116	1	*	2	*
Metallurgy.....	247	1	*	1	*
Physical Metallurgy....	250	1	*	1	*
Zymology.....	283	*	*	*	*

\*All time not otherwise allotted must be spent in the various laboratories in the proportions assigned by the Department.

## 7. DEPARTMENT OF ELECTRICAL ENGINEERING

The course in electrical engineering is designed for those who are looking forward to work in connection with the design, manufacture, installation, or operation of electrical machinery and equipment for the generation, transmission, and utilization of power, for domestic and industrial purposes including its many applications to problems of intercommunication in connection with railway, telephone, telegraph, or radio equipment, to work in connection with electrochemical processes, and to administrative work in connection with both Engineering and Industrial undertakings.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry.....	238	1	0	2	0
Descriptive Geometry.....	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry.....	85	2	0	1	0
Electricity.....	135	2	0	2	0
Illuminating Engineering..	185	1	2	1	2
Technical English.....	122(a)	1	0	1	0
Business.....	121	0	0	1	0
Engineering Drawing.....	166	0	11	0	18
Physical Training.....		0	2	0	0

## ELECTRICAL ENGINEERING—SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Vacation Work.....	286				
Calculus.....	237	1	0	1	0
Descriptive Geometry.....	162	1	0	1	0
Dynamics.....	3	1	0	1	0
Mechanics of Materials.....	4	2	0	2	0
Engineering Chemistry.....	93	1	0	0	0
Organic Chemistry.....	95	0	0	1	0
Inorganic Chemistry A.....	87A	1	0	0	0
Hydrostatics.....	186	0	0	1	1½
Elementary Machine Design.....	232	1	0	1	0
Electricity.....	136, 137	2	3	2	3
Steam Engines.....	216	1	0	1	0
Theory of Mechanism.....	230	2	1½	2	1½
Economics and Finance.....	123	1	0	1	0
Chemical Laboratory.....	89	0	3	0	3
Engineering Drawing.....	166	0	12	0	12
Physical Training.....		0	2	0	2

## THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Thermodynamics.....	217, 219	2	2	2	1½
Hydraulics.....	206	2	0	2	1
Heat Engines.....	218	1	0	1	0
Mechanics of Machinery.	231	1	0	1	0
Machine Design.....	233	2	4½	2	4½
Alternating Current.....	139	1	0	2	0
Physical Metallurgy.....	244	0	0	2	0
Electrochemistry.....	107, 108	2	3	0	0
Magnetism and Electricity.....	138	2	0	1	0
Electrical Design.....	141, 142	1	3	1	3
Commercial Law.....	124	1	0	1	0
Electrical Laboratory....	140	0	6	0	6

## ELECTRICAL ENGINEERING—FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285				
Engineering Economics..	125	0	0	1	0
Industrial Management ..	130	1	0	1	0
Applied Electricity.....	145, 146	4	20	4	19
AND ONE OF:					
Hydraulics.....	207, 208, 209	3	9	3	10
Thermodynamics.....	220, 221, 222	3	9	3	9
Electrochemistry.....	114, 115	2	9	2	9
OR:					
Radiotelegraphy .....	147, 148	2	9	2	9
and					
Acoustics.....	190	1	1	0	0

## 8. DEPARTMENT OF METALLURGICAL ENGINEERING

This course is designed for those who intend to take up work in connection with the production, treatment and working of metals for the purposes of industry; or the design, construction, or operation of metallurgical plants including smelters, furnaces, foundries, refineries, and lixiviation works; and administrative work in connection with both Engineering and Industrial undertakings.

### FIRST YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Calculus.....	236	2	0	2	0
Analytical Geometry....	238	1	0	2	0
Descriptive Geometry...	160	1	0	1	0
Surveying.....	270, 271	1	5	1	0
Statics.....	1	2	0	2	0
Dynamics.....	2	2	0	2	0
Elementary Chemistry..	85	2	0	1	0
Electricity.....	135	2	0	2	0
Technical English.....	122(a)	1	0	1	0
Business.....	121	0	0	1	0
Mineralogy Laboratory..	256	0	0	0	3
Engineering Drawing....	166	0	11	0	14
Physical Training.....		0	2	0	2

### SECOND YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Dynamics.....	3	1	0	1	0
Mechanics of Materials..	4	2	0	2	0
Chemistry.....	87A, 87B, 88, 91	2	14	1	13
Metallurgy.....	241, 242	1	0	2	0
Geology and Ore Deposits.....	196	1	1	1	1
Steam Engines.....	216	1	0	0	0
Electricity.....	136, 137	2	3	2	3
Spanish.....	268	1	0	1	0
Economics and Finance..	123	1	0	1	0
Engineering Drawing....	172	0	3	0	6
Physical Training.....		0	2	0	2

## METALLURGICAL ENGINEERING—THIRD YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Engineering Chemistry..	102	1	0	1	0
Cements and Concrete...	11	0	0	1	0
Heat Engines.....	218	1	0	1	0
Electricity.....	143, 144	1	3	1	3
Electrochemistry.....	107, 108	2	3	0	0
Assaying.....	45, 46	1	3	0	3
Ore Dressing.....	58, 59	1	3	1	3
Mining.....	51, 52	1	0	1	0
Metallurgy.....	245	2	3	1	6
Physical Metallurgy.....	246	1	3	1	0
Machine Design.....	234	1	0	1	3
Commercial Law.....	124	1	0	1	0
Chemical Laboratory.....	101	0	0	0	6
Engineering Drawing....	177	0	3	0	0
Analytical Chemistry....	88	1	0	1	0

## FOURTH YEAR

Subject	No.	Hours per week			
		First Term		Second Term	
		Lect.	Lab'y	Lect.	Lab'y
Thesis.....	285	0	6	0	6
Engineering Economics..	125	0	0	1	0
Contracts and Specifica- tions.....	127	0	0	1	0
Plant Management.....	129	0	0	1	0
Thermodynamics.....	223	1	0	1	0
Assaying.....	47, 48	0	0	1	3
Ore Dressing.....	60, 61	1	6	1	0
Electrochemistry.....	114, 115	2	3	2	3
Metallurgy.....	249	1	0	1	0
Metallurgy Problems...	248	2	4	2	4
Physical Metallurgy....	250	1	3	1	3
Power	Thermodynamic Laboratory....	224	0	3	0
	Hydraulic Lab- oratory.....	210	0	0	3

## OUTLINE OF LECTURE AND LABORATORY COURSES PROCEEDING TO BACHELOR DEGREES

On the following pages the courses of instruction are set forth in detail. The time devoted to the various subjects, both for lectures and practical work, is indicated as accurately as possible; the hours, however, shown in the prescriptive schedules on pages 37 to 59 will govern.

The curriculum as printed is intended to cover the prescription for the current year only and does not imply the right of a student to have the course unchanged during any subsequent year of his attendance.

The courses are designed to give the student a sound training in the fundamental scientific principles on which the various branches of engineering are based. The instruction is given by means of lectures and practical work in the laboratories, the drafting rooms and the field.

The courses in the first two years are devoted to the theoretical and essential scientific requirements of the engineering profession as a whole, with an introduction in a few cases of the practical application of these to engineering problems.

In the third and fourth years, the subjects of the former years are continued with particular attention paid to their application to modern engineering practice in the problems of design, erection, installation and operation peculiar to the several branches of the profession.

### APPLIED MECHANICS

**1. Statics:**—T. R. Loudon.

All Departments, I Year; 2 hours per week, both terms.

This course of lectures deals with forces in a single plane, and concerns chiefly the calculation of tension, compression and shearing stresses in frame structures and solid beams. It also deals with the consideration of problems relating to friction.

**2. Dynamics:**—T. R. Loudon.

Departments 1, 2, 3, 6, 7, 8, I Year; 2 hours per week; both terms. This course of lectures deals with bodies having motion of translation in one plane; also with relative motion, momentum, work and energy.

Text Book:—Tutorial Dynamics—Briggs and Bryan.

**3. Dynamics of Rotation:**—W. J. Loudon.

Departments 1, 2, 3, 7, 8, II Year; 1 hour per week; both terms.

This course covers angular motion, including moments of inertia simple harmonic motion, the pendulum, centres of mass, suspension and percussion, the simple theory of the fly-wheel and the governor.

Text Book:—Dynamics of Rotation—Loudon.

**4. Mechanics of Materials:**—P. Gillespie.

Departments 1, 2, 3, 6, 7, 8, II Year; 2 hours per week; both terms. In this course the strength and elasticity of materials are mathematically treated. The stresses in such elements of structures as the tie rod, the beam, the strut and the member subjected to shear are investigated and the elementary principles of design established. In the lecture and drafting rooms through numerous problems involving the design of simple beams, columns, riveted connections, etc., these principles are exemplified. The work includes also the discussion of eccentric loading, suddenly applied loads and repeated stresses.

Reference Book:—Mechanics of Materials—Merriman.

**5. Mechanics of Materials:**—T. R. Loudon.

Department 4, II Year; 2 hours per week; both terms.

This course deals with the mathematical consideration of stress and elasticity. Among the problems taken up are the consideration of riveted joints, theory of simple and continuous beams, the theory of columns and simple column footings.

**6. Theory of Structures:**—C. R. Young.

Department 1, III Year; 2 hours per week; both terms.

The work of the first term comprises a thorough discussion of combined stresses, columns, restrained, continuous and trussed beams, multiple beam and box girders, and plate girders. A number of designs of structures and structural details are worked out in the class and drafting rooms.

The second term is given chiefly to the design of a riveted truss highway span and a riveted truss railway span, the complete designs being made in the lecture and drafting rooms.

Text Books:—Modern Framed Structures, Part III—Johnson, Bryan and Turneaure; Structural Problems—Young; Carnegie Pocket Companion; Cambria Steel.

**7. Theory of Structures:**—C. R. Young.

Departments 2, 3, 6, III Year; 2 hours per week; first term.

The work is practically the same as that for Department I in the first term.

**8. Structural Design:**—T. R. Loudon.

Department 4, III Year; 2 hours per week; both terms.

During the first term, the economics of the design of floor systems in timber and structural steel are discussed. The design of masonry piers, structural steel and timber columns is also gone into in the first term.

The second term is taken up in the discussion of the design of roof trusses and plate girders.

**9. Mechanics of Materials:**—P. Gillespie.

Departments 1, 2, 3, III Year; 3 hours per week; one term.

This laboratory course is intended to give the student an introduction to the experimental study of the strength and elasticity of materials. It is intended that he shall acquire some familiarity with the construction and operation of testing machines and with the properties of the ordinary building materials.

Reference:—*Laboratory Instruction Sheets, Department of Civil Engineering and Applied Mechanics, U. of T., 1922.*

**10. Stress Graphics:**—T. R. Loudon.

Department 1, III Year; one hour per week; both terms.

This course of lectures deals mainly with graphic methods of solving stresses in framed structures. The construction of Shearing Force diagrams, Bending Moment diagrams and Influence Lines is also dealt with.

Text Book:—*Graphic Analysis*—Wolfe.

**10(a). Compound Stress:**—T. R. Loudon.

Department 3, III Year; one hour per week, first term.

This course deals mainly with the discussion of methods determining the stress conditions in bodies subjected to compound stress. Both analytical and graphical methods of analysis are discussed.

**11. Cements and Concrete:**—P. Gillespie.

Departments, 1, 8, III Year; one hour per week; second term.

The manufacture, testing and use of Portland cement and the fundamentals of the theory of reinforced concrete are discussed in this course of lectures.

**12. Theory of Structures:**—C. R. Young.

Departments 1c, 1d, 1e, IV Year; 2 hours per week; both terms.

The work comprised in this course of lectures concerns swing bridges, arches, suspension bridges, cantilever bridges, deflections, and secondary stresses. Problems based on the lectures are worked out in the drafting rooms.

Reference Books:—*Modern Framed Structures, Part II*—Johnson, Bryan and Turneaure.

**13. Mechanics of Materials:**—P. Gillespie.

Departments 1, 3, IV Year; a laboratory course of 3 hours per week one term and 6 hours per week the other term.

This course of experiments is intended to give the student practice in investigating the elastic and physical properties of iron, steel, concrete, timber, etc., and in the use of instruments of precision designed for that purpose.

Reference Book:—*Materials of Construction*—Johnson.

14. *Foundations, Retaining Walls and Dams*:—P. Gillespie, W. J. Smither. Department 1, IV Year; Department 3, IV Year, Option (b); 1 hour per week; both terms.

This course of lectures is devoted to the design of the structures mentioned. Preparatory to the discussion of the practical aspects of the subjects, and in order to gain familiarity with the fundamental principles involved, a part of the first term is given over to the consideration of the theory of compound stress. The most approved forms of construction of retaining walls, footings, abutments, piers and dams are then described, and typical designs are worked out in the class and drafting rooms.

Some attention is also given to the principles of formula charting.

**Text Books and Books of Reference:**—Retaining Walls for Earth—M. A. Howe; Walls, Bins and Grain Elevators—M. S. Ketchum; A Treatise on Masonry Construction—I. O. Baker; Design and Construction of Dams—E. Wegmann.

15. *Reinforced Concrete*:—P. Gillespie.

Department 1, IV Year; Department 3, IV Year, Option (b); 1 hour per week; both terms.

The theory of the strength of reinforced concrete elements including the beam, the slab, the T-beam, the column and the footing, is continued in this course.

The analysis of the monolithic arch by the elastic theory is discussed, and the student is required in the drafting room to apply his knowledge to the design of simple structures.

**Reference books:**—Principles of Reinforced Concrete Construction—Turneaure and Maurer; Reinforced Concrete Construction, Vol. I—Hool.

16. *Structural Design*:—T. R. Loudon.

Department 4, IV Year; 1 hour per week; both terms.

During this course of lectures, the economics of the design of complete buildings in timber, reinforced concrete and steel are discussed. This course of lectures is supplemented by the actual designing of buildings in the drafting room.

17. *Structural Design*:—C. R. Young, W. J. Smither.

Department 1<sub>c</sub>, 1<sub>d</sub>, IV Year; 1 hour per week; both terms.

Department 1<sub>b</sub> and 3, IV Year; 1 hour per week; first term.

This course of lectures is devoted to the problems connected with the structural design of buildings of timber, steel and reinforced concrete. The various structural elements such as the floors, columns, footings, walls and wind bracing, are fully discussed, and portions of typical buildings are designed in the class and drafting rooms.

**Text Books:**—Handbook of Building Construction—Hool and Johnson; Architects' and Builders' Handbook—Kidder—Nolan.

18. *Structural Design*:—C. R. Young, W. J. Smither.  
 Departments 1<sub>e</sub>, 1<sub>d</sub>, and 3, IV Year; 1 hour per week; first term.  
 Consideration is given in this course to the various types of mill buildings, to the conditions governing the choice and to the details of construction in different materials. Designs of portions of mill buildings are worked out in the class and drafting rooms.  
 Text Books:—Steel Mill Buildings—Ketchum. Mill Buildings—Tyrrell;
19. *Miscellaneous Structures*:—W. J. Smither.  
 Department 1, IV Year; 1 hour per week; second term.  
 In this course of lectures the application of theoretical principles to the design of a variety of structures is made. Among those structures discussed are transmission line towers, elevated tanks and their supporting towers, standpipes, large pressure pipes, sewers, culverts, small highway bridges, sub-surface tanks and tall chimneys. Whenever possible the lecture work is followed up by designs in the drafting room.
20. *Railway Structures*:—C. R. Young.  
 Department 1<sub>e</sub>, IV Year; 1 hour per week; first term.  
 A course of lectures with exercises covering alternative bridge layouts with comparative estimates of costs, temporary and permanent trestles, tunnels, tunnels vs. bridges, buildings, turntables, snow sheds and shelters.

## ARCHITECTURE

25. *History of Architecture*:—H. H. Madill.  
 Department 4, I Year; 1 hour per week; both terms.  
 In this course the development of architecture is treated very briefly and in an elementary manner, from the Pyramids of Egypt to the present day.
26. *History of Architecture*:—  
 Department 4, II Year; 1 hour per week; both terms.  
 The Antique, Renaissance and the Modern styles are dealt with more fully than is possible in the elementary history.
27. *History of Architecture*:—A. W. McConnell.  
 Department 4, III Year; 1 hour per week; both terms.  
 In this course the work of the previous year is continued, with special attention given to the development of buildings in planning and detail.
28. *Elements of Architecture*:—H. H. Madill.  
 Department 4, I Year; 1 hour per week; both terms.  
 Lectures on the Five Orders of Architecture, their affiliated forms and the other elements used in design. Simple problems in elementary design involving the use of the orders and other elements are set from time to time.

29. *History of Ornament*:—H. H. Madill.

Department 4, II Year; 1 hour per week; both terms.

In this course the development of Ornament is traced from the beginning through Egyptian, Assyrian, Grecian, Roman, Byzantine, Romanesque, Gothic and Renaissance styles. An attempt is made to analyze ornament of the best periods and to systematize the principles followed in form and colour. The development and types of mouldings are also studied.

30. *History of Fine Art*:—C. W. Jefferys, Frederick Coates.

Department 4, III Year; 1 hour per week; both terms.

In the first term the course consists of an outline of the history and development of painting and of the minor pictorial arts from the earliest time until the present day.

In the second term an outline of the history and development of the different eras of sculpture ranging from the primitive to the present day, is given.

31. *Architectural Design*:—A. W. McConnell.

Department 4, II Year; 1 hour per week; both terms.

This course is given by means of individual instruction in the classroom by criticisms of the solutions of different problems set during the year and by a series of lectures. It is in this course that the student begins the serious study of design; continued practice in architectural drawing and rendering affords the training necessary to make the student a proficient draughtsman.

32. *Architectural Design*:—A. W. McConnell.

Department 4, III Year.

Theory and practice of Design.

This course is given by individual instruction in the studio and by lectures. The greater part of the course is devoted to problems in design, and forms a continuation of the course given in the preceding year.

33. *Architectural Design*:—A. W. McConnell.

Department 4, IV Year.

The entire course is devoted to advanced academic training in designing the more monumental classes of buildings.

34. *Architectural Design*:—A. W. McConnell.

Department 4, IV Year; Architectural Engineering Option.

A short course of lectures and studio work referring especially to the artistic side of the design of commercial buildings.

35. *Freehand Drawing and Water Colour Painting*:—C. W. Jefferys.

Department 4, I Year; 3 hours per week; both terms.

Drawing from still life objects. Primary free hand perspective. Primary pencil, charcoal, and pen and ink rendering.

- 35a. Department 4, II Year; 3 hours per week; both terms.  
Drawing and monochrome painting from still life.  
Drawing from the cast.  
Pencil, pen and ink, and monochrome rendering.  
Primary water colour.  
Drawing from landscape and natural objects.
- 35b. Department 4, III Year; 3 hours per week; both terms.  
Drawing from the cast.  
Water colour from still life. Water colour rendering.  
Drawing from landscape and natural objects.  
Students who are sufficiently advanced are admitted to the Fourth Year Life Drawing Class.
- 35c. Department 4, IV Year; 3 hours per week; both terms.  
Water colour from still life and from landscape.  
Drawing from life.  
Water colour rendering.
36. *Modelling*:—Frederick Coates.  
Department 4, I Year; 2 hours per week; both terms.  
The Orders. Synopsis of styles.
- 36a. Department 4, II Year; 2 hours per week; both terms.  
Problems in figures and in relation to architecture.
- 36b. Department 4, III Year; 2 hours per week; both terms.  
Styles continued.  
Problems, combination of figure, ornament and architecture and their relative values.
- 36c. Department 4, IV Year; 2 hours per week; both terms.  
Modelling from life.  
Anatomy.  
Composition of groups.
37. *Building Measurement*:—C. H. C. Wright.  
Department 4, 1 Year; 1 hour per week; both terms.  
In this course of lectures the principles of measurements and mensuration with special reference to buildings will be discussed. With this is combined practice in measurements of existing buildings, quantities, etc.
38. *Building Materials*:—C. H. C. Wright.  
Department 4, III Year; 2 hours per week; both terms.  
The structural and aesthetic value of the various building materials.
39. *Sanitary Science*:—H. H. Madill.  
Department 4, IV Year; 1 hour per week; both terms.  
Modern plumbing, its design and installation, drainage, sewerage disposal and water supply.
40. *Heating and Ventilating*:—C. H. C. Wright.  
Department 4, IV Year; 1 hour per week; both terms.  
The design of different systems, where they should be used, heating specifications, etc.

## ASSAYING, MINING AND ORE DRESSING

The work in Mining is directed more to the development of the proper attitude of mind towards mining problems than to the teaching of actual mining methods.

The teaching of Assaying has a two-fold function. The first is to give the student a working knowledge of the practice of the art, so that he can earn money as an assayer on graduation and use this as a stepping-stone to other positions. The second is to use the assaying laboratories for the training of the students in certain important phases of Engineering methods. The size of the apparatus, the completeness of the processes in short intervals of time, the extreme accuracy of results when so desired, the relation of the extent of error to time and method, the similarity of the academic laboratory to the field laboratory, all these permit an unrivalled opportunity for driving home much broad Engineering philosophy. The assaying processes and apparatus lend themselves peculiarly well for the development of a proper perspective in regard to errors and accuracy in measurements.

The study of Ore Dressing, when accompanied by laboratory work in a well equipped ore dressing laboratory, is one of the most important of the Mining Engineering subjects. Not only is the mechanical treatment of ores a very important branch of Mining Engineering, but the mental processes involved in a study of the fundamental principles underlying the art and the compromise necessary for field practice form one of the best fields for the development of Engineering philosophy. From these points of view the ore dressing laboratory is exceptionally well equipped.

### 45. *Assaying*:—J. T. King.

Departments 2 and 8, III Year; 1 hour per week; first term.

A first course of lectures on the theory of fire assaying. Emphasis is laid not only on the chemical and metallurgical principles involved, but upon the errors inherent in operators as well as in methods.

Text Book—"Fulton" Manual of Fire Assaying.

### 46. *Assaying*:—J. T. King.

Departments 2 and 8, III Year; 3 hours per week; both terms.

A laboratory course in the determination of the precious metals in ores, milling and metallurgical products. Scorification and crucible assays of ores and products, pure and impure, fluxes, slags and solutions. Buckboard practice, ores with metallics. Copper and lead by electrolysis. Students are expected to do their later assays with despatch and a reasonable degree of accuracy. Neatness of work is required.

47. *Assaying*:—J. T. King.

Departments 2 and 8, IV Year; 1 hour lecture per week; second term.  
A continuation of course 45. Complex ores. Combination assays.  
The sampling and assay of bullion. The Platinum group metals.  
Checks and corrections.

48. *Assaying*:—J. T. King.

Departments 2 and 8, IV Year; 3 hours per week; second term.  
An advanced laboratory course in which some of the methods of  
course 47 are used.

49. *Assaying*:—J. T. King.

Department 6, III Year; 3 hours per week; one term.  
An introductory laboratory course for Chemical Engineers. Some  
lecture instruction is given. An abbreviation of courses 45  
and 46.

50. *Mining*:—H. E. T. Haultain and F. C. Dyer.

Department 2, I Year; 3 hours per week; second term.  
A laboratory course, including some lectures, being an introduction  
to certain mining and milling machinery and methods.

51. *Mining*:—H. E. T. Haultain.

Department 2, II Year and Department 8, III Year; 1 hour per  
week; first term.  
An introductory course of lectures.

52. *Mining*:—H. E. T. Haultain.

Department 8, III Year; 1 hour per week; second term.  
An extension of No. 51.

53. *Mining*:—F. C. Dyer.

Department 2, II Year; 3 hours per week; one term.  
Continuation of No. 50. Rock drills, sampling methods, use of  
explosives.

54. *Mining*:—H. E. T. Haultain and F. C. Dyer.

Department 2, III Year; 2 hours per week; second term.  
Principles of mining.

55. *Mining*:—H. E. T. Haultain.

Department 2, IV Year; 1 hour per week; both terms.  
Special problems, estimates, reports.

56. *Mine Cost Keeping and Management*:—H. E. T. Haultain.

Department 2, IV Year; 1 hour per week; both terms.  
One of the fundamental features that must not be lost sight of by  
the Mining Engineer is, that his work is designed primarily for  
purposes of financial profit. This course of lectures deals with

details from this point of view. The total cost of a ton of ore requiring as it does an understanding of the problems of amortization, is first dealt with in a broad way. Then are considered various problems of cost keeping, leading on to problems of time and motion study which are essential to the development of the fine points of the art in any particular mining problem. The latter part of the course deals with problems of management, the relations of members of the staff to each other, and the relations of the staff to labour.

58. *Ore Dressing*:—H. E. T. Haultain and F. C. Dyer.

Departments 2 and 8, III Year; 1 hour per week; both terms.  
The general principles of Ore dressing.

59. *Ore Dressing*:—F. C. Dyer.

Departments 2 and 8, III Year; 3 hours per week; both terms.

Work with crushing machinery, principles of crushing and grading screen analyses, concentration with gravity separation apparatus, etc.

60. *Ore Dressing*:—H. E. T. Haultain and F. C. Dyer.

Departments 2 and 8, IV Year; 1 hour per week; both terms.  
No. 58 continued, study of flow sheets and special problems.

61. *Ore Dressing*:—F. C. Dyer.

Departments 2 and 8, IV Year; 6 continuous hours per week; one term.

Advanced work with ore dressing appliances, ore testing and check mill runs.

62. *Ore Dressing*:—F. C. Dyer.

Department 6k, IV Year; 1 hour per week; both terms.  
General principles of ore dressing.

63. *Ore Dressing*:—F. C. Dyer.

Department 6k, IV Year; 1 period of 6 hours per week; second term.  
Principles of sampling, crushing and grading, screen analyses, concentration with gravity separation apparatus, flotation, ore testing, etc.

64. *Physics of Ore Dressing*:—H. E. T. Haultain and F. C. Dyer.

Department 2, III Year; 1 hour per week; both terms.

Ore dressing methods involve a study of the laws governing the phenomena of surface tension, capillarity and colloidal solutions, in addition to those of hydrostatics and certain phases of hydraulics. This is embodied in a special course of lectures in conjunction with laboratory work in the Ore dressing laboratory.

65. *Theory of Measurement*:—H. E. T. Haultain.

Department 2, II Year; 1 hour per week; one term.

This title is not an entirely suitable one for this course of lectures because it is generally applied to a study of the philosophy of extremely accurate measurements. The Mining Engineer has to continually make satisfactory use of measurements with a wide range of inaccuracy. This course of lectures deals with the philosophy underlying the causes of these errors and the practical application of such approximations. The opportunity is taken in these lectures to deal with the subject of illustrating measurements by graphs.

66. *Introductory Research*:—H. E. T. Haultain and F. C. Dyer.

Department 2, III Year; 3 hours per week; second term.

This is a laboratory course including some lectures and is a preparation for the thesis of the fourth year.

67. *Thesis*.

Department 2, IV Year; 7 hours per week; first term; 10 hours per week, second term, in continuous periods.

Thesis in this department consists mainly in reports on original work done in the laboratories. In the III year the subject "Introductory Research" paves the way for the thesis. During the month of October the student decides on the subject of his thesis in consultation with his professors. After this is decided the student uses his own initiative in the development of his work.

The thesis is divided into three parts. The first part, which is handed in during the first week in November, contains the title, a statement of what the title is meant to convey and an outline of the work that is proposed to be done. The second part is handed in during the first week of January and contains a report of progress to date and enables the professor in charge to keep in closer touch with the work. The third and final part is handed in a week before the examinations and is a report of progress to date with final conclusions. The three parts combined constitute the thesis.

68. *Vacation Letters*.

Department 2, III Year and IV Year.

These are a series of letters written during the summer vacation, dealing with various aspects of a mining engineer's work. They are intended to direct and help the student's powers of observation, analysis and criticism as well as being exercises in the art of lucid technical expression. See page 29 for instructions.

69. *Vacation Work*.

Department 2, II Year.

See page 29 for detailed instructions.

## ASTRONOMY AND GEODESY

**71. *Astronomy, Elementary:***—C. A. Chant.

Department 1, II Year; 1 hour per week, both terms.

A course in descriptive Astronomy, explaining the ordinary astronomical terms, and describing the various celestial bodies and their motions. In the evenings opportunity will be given for identifying the stars and for observing with telescopes.

Text book:—Manual of Astronomy—C. A. Young.

**72. *Astronomy and Geodesy:***—L. B. Stewart.

Department 1, III Year; 2 hours per week.

The course of lectures deals with the determination of time, latitude, longitude and azimuth, by methods adapted to the use of the surveyor's transit and the sextant. It is designed to fulfil the requirements of the final examinations for Ontario and Dominion Land Surveyors.

In Geodesy an account is given of the principles and methods of a secondary triangulation survey, also of the principles involved in the North-West system of survey.

Text books:—Practical Astronomy as applied to Geodesy and Navigation—Doolittle; Nautical Almanac, 1925.

**73. *Field Work:***—L. B. Stewart, S. R. Crerar.

Department 1, III Year; about 2 hours per week, first term.

The practical work in this subject comprises observations in the field with the transit and sextant for the determination of time, latitude and azimuth by the methods described in the lectures.

**74. *Astronomy (Advanced):***—L. B. Stewart.

Department 1, IV Year; 2 hours per week.

The lecture course in this subject comprises the theory and adjustment of the instruments used in connection with a geodetic survey; the methods of taking and reducing observations for time, longitude, latitude, and azimuth, with the precision required on such a survey; and other matters relating to these subjects.

**75. *Geodesy and Metrology:***—L. B. Stewart.

Department 1, IV Year; 2 hours per week.

The lecture course includes a description of the methods of measuring base lines and the angles of a triangulation; the geometry of the spheroid with applications to geodetic problems; the computation of geodetic positions; the solution of large triangles on the earth's surface, and the adjustment of a triangulation; trigonometric and precise spirit levelling; the determination of the figure of the earth by arc measurements, and by the pendulum; the theory of map projections, etc.

76. *Astronomy, Geodesy and Metrology*:—L. B. Stewart.

Department 1, IV Year; about 23 hours per week.

The practical work in the above subjects includes the observation of meridian transits for time and longitude determinations, and of prime vertical transits for latitude, with the astronomical transit instrument; the observation of meridian zenith distances of stars, and of azimuths at elongation for latitude, with the alt-azimuth; theodolite observations for azimuth; observations for latitude with the zenith telescope; the investigation of the constants of the instruments used, and the reduction of all observations; the measurement of a base line with the steel tape and with invar wires, and the determination of the constants of the tape; the measurement of the angles of a triangulation and the adjustment of the angles of network of triangles, etc. A portion of this work will be taken at the Summer Survey Camp. (See page 31.)

## BIOLOGY

80. *Elementary Biology*:—J. H. Faull.

Department 6, I Year; 3 hours per week, each term.

An elementary laboratory course on the nature and identification of plant and animal tissues and products, with microscope practice.

81. *Elementary Biology*:—J. W. MacArthur.

Department 1<sub>b</sub>, IV Year.

A special Course of Laboratory work and demonstrations in General Biology, five hours per week, first term.

82. *Hygiene and Bacteriology*:—D. T. Fraser and R. R. McClenahan.

Departments 1<sub>b</sub> and 6, IV Year.

- (1) This is a course of twenty-five lectures, dealing with the principles of Hygiene and Sanitary Science and including a discussion of the facts in Bacteriology which are necessary for a proper understanding of Hygiene and Sanitary Science. The particular phases of the subject which are of importance from the standpoint of Sanitary Engineering are dealt with.
- (2) This is a laboratory course of six hours per week, second term, dealing especially with the Bacteriology of water, milk and sewage.

## CHEMISTRY

85. *Elementary Chemistry*:—E. G. R. Ardagh.

Departments 1, 2, 3, 6, 7, 8, I Year; 2 hours per week, first term; 1 hour per week, second term.

A lecture course in elementary chemistry dealing with the non-metals, with experimental illustrations.

88. *Inorganic Chemistry*:—L. J. Rogers.

Department 6, I Year; 10 hours per week, both terms.

A laboratory course of quantitative experiments illustrating the use of the sensitive balance, and confirming the fundamental laws of chemistry; qualitative inorganic analysis; quantitative analysis of pure salts; inorganic preparations; molar weight determinations.

Text books:—Analytical Chemistry, Vol. II—Treadwell Hall; Qualitative Chemical Analysis—A. A. Noyes.

87A. *Inorganic Chemistry A*:—E. G. R. Ardagh.

Departments 1, 2, 3, 6, 7 and 8, II Year; 1 hour per week, first term.

A continuation of Course 85 dealing especially with the metals.

87B. *Inorganic Chemistry B*:—E. G. R. Ardagh.

Departments 2, 6 and 8, II Year; 1 hour per week, second term.

A lecture course on theoretical chemistry with special reference to the metals; a continuation of Course 85.

Text book:—Smith's College Chemistry—Kendall.

88. *Analytical Chemistry*:—L. J. Rogers.

Departments 2, 6 and 8, III Year; 1 hour per week, both terms.

A lecture course on the principles of chemical analysis; select gravimetric and volumetric methods; technical analysis.

89. *Analytical Chemistry*:—E. G. R. Ardagh.

Departments 1, 2, 3 and 7, II Year; 3 hours per week.

Laboratory practice in elementary qualitative and quantitative analysis.

Text book:—A Smaller Chemical Analysis—Newth.

90. *Analytical Chemistry*:—J. W. Bain.

Department 2, II Year; 3 hours per week, both terms.

A laboratory course in the gravimetric determination of metals and acids, with elementary volumetric analysis.

Text book:—A Manual of Chemical Analysis, Qualitative and Quantitative—Newth.

91. *Analytical Chemistry*:—L. J. Rogers.

Department 8, II Year; about 12 hours per week.

A laboratory course comprising gravimetric and volumetric methods, acidimetry and alkalimetry.

Text books:—Analytical Chemistry, Vol. II—Treadwell Hall, Qualitative Chemical Analysis—A. A. Noyes.

92. *Analytical Chemistry*:—L. J. Rogers.

Department 6, II Year; 180 hours.

A laboratory course in quantitative chemical analysis; inorganic preparations.

Text book:—Analytical Chemistry, Vol. II—Treadwell Hall.

93. *Engineering Chemistry*:—J. W. Bain.  
Departments 1, 3, 6 and 7, II Year; 1 hour per week, first term.  
A lecture course consisting of a study of the industrial production and application of heat and light, and of the chemistry of fuel and the products of combustion.
94. *Industrial Chemistry*:—J. W. Bain.  
Department 6, II Year; 1 hour per week, both terms.  
A lecture course on the manufacture of salts, acids, alkalies and inorganic chemicals.
95. *Organic Chemistry*:—M. C. Boswell.  
Departments 1, 2, 3 and 7, II Year; 1 hour per week, second term.  
A lecture course in elementary organic chemistry.
96. *Organic Chemistry*:—M. C. Boswell.  
Department 6, II Year; 2 hours per week, both terms.  
A lecture course dealing with the aliphatic compounds.
97. *Organic Chemistry*:—M. C. Boswell.  
Department 6, II Year; 60 hours.  
A laboratory course in organic preparations.
98. *Physical Chemistry*:—F. B. Kenrick.  
Departments 6, II Year; 2 hours per week, both terms.  
A course of lectures on the elements of chemical mechanics, and the theory of solutions.
99. *Analytical Chemistry*:—L. J. Rogers.  
Department 2, III Year; 3 hours per week, first term; 6 hours per week, second term.  
A laboratory course on the technical analysis of ores and furnace products.
100. *Industrial Chemistry*:—E. G. R. Ardagh.  
Department 6, III Year; about 10 hours per week.  
A laboratory course in industrial chemistry.
101. *Analytical Chemistry and Phase Rule*:—L. J. Rogers, J. T. Burt-Gerrans.  
Department 8, III Year; about 6 hours per week.  
A laboratory course in analysis and phase rule.
102. *Engineering Chemistry*:—J. W. Bain, E. G. R. Ardagh.  
Departments 1, 2, 3, 6, 7 and 8, III Year; 1 hour per week, both terms.  
A lecture course on the application of chemistry to engineering problems; air, water, sewage, the materials of construction explosives, etc.

103. *Industrial Chemistry*:—E. G. R. Ardagh.

Department 6, III Year; 1 hour per week, both terms.

A lecture course on petroleum and its products, coal tar and its products; fats, oils, soap, sugar, starch, and gums; fermentation industries, etc.

104. *Chemical Plant*:—J. W. Bain.

Department 6, III Year; 1 hour per week, both terms.

A lecture course on the machinery and plant used in chemical manufacturing.

105. *Organic Chemistry*:—M. C. Boswell.

Department 6, III Year; 2 hours per week, both terms.

A lecture course on the aromatic series.

106. *Organic Chemistry*:—M. C. Boswell.

Department 6, III Year; 85 hours.

A laboratory course in organic preparations in the aromatic series.

107. *Electrochemistry*:—W. L. Miller.

Departments 6, 7 and 8, III Year; Department 2, IV Year; 2 hours per week, first term.

A lecture course on elementary electrochemistry, illustrated by experiments.

108. *Electrochemistry*:—W. L. Miller and J. T. Burt-Gerrans.

Departments 6, 7 and 8, III Year; 3 hours per week, first term.

Department 2, IV Year.

A laboratory course in quantitative measurements to accompany Course 107.

109. *Inorganic Chemistry*:—J. W. Bain.

Department 6, IV Year; 2 hours per week, both terms.

A lecture course on chemical theory.

110. *Organic Chemistry*:—M. C. Boswell.

Department 6, IV Year; 1 hour per week, both terms.

A lecture course on advanced organic chemistry.

111. *Organic Chemistry*:—M. C. Boswell.

Department 6, IV Year.

A laboratory course in advanced organic chemistry.

112. *Industrial Chemistry*:—J. W. Bain.

Department 6, IV Year; 1 hour per week, both terms.

A lecture course on selected subjects in chemical technology.

113. *Industrial Chemistry*:—J. W. Bain, E. G. R. Ardagh, M. C. Boswell.

Department 6, IV Year.

A laboratory course in industrial problems.

114. *Electrochemistry*:—J. T. Burt-Gerrans.

Department 6, 7 and 8, IV Year; 2 hours per week, both terms.

An advanced lecture course on the theory of solutions and electrolysis, and the application to the practice of electro-deposition and electrolytic refining of metals. The course also includes lectures on the electric furnace with special consideration of efficiency.

Text books:—Electrometallurgy—Borchers; Electrochemistry—Le Blanc; Electrochemistry—Luepke; The Electric Furnace—Stansfield.

115. *Electrochemistry*:—W. L. Miller and J. T. Burt-Gerrans.

Departments 6, 7 and 8, IV Year.

A laboratory course accompanying Course 114.

116. *Sanitary and Forensic Chemistry*:—J. W. Bain.

Department 6, IV Year; 1 hour per week, both terms.

A lecture course on the composition and examination of air, water and food; poisons and their detection, with accompanying laboratory course.

117. *Sanitary Chemistry*:—E. G. R. Ardagh.

Department 1<sub>b</sub>, IV Year.

A lecture and laboratory course on water supply, sewage disposal ventilation, etc.

## ECONOMICS AND BUSINESS ADMINISTRATION

121. *Business*:—W. S. Ferguson.

Departments 1, 2, 3, 6, 7, 8, I Year; 1 hour per week, second term.

A lecture course on the principles underlying accounting and general business methods of a simple nature in order to enable the student to understand simple financial reports.

122. *Technical English*:—S. G. Bennett.

(a) All Departments, I Year; 1 hour per week, both terms.

A lecture course on the expression of ideas and the compilation and writing of different types of engineering reports; technical exposition; the derivation and use of technical terms; the necessity of accurate expression in professional writing; terminology; the use of graphic methods for presenting facts; abbreviations; numbers; symbols.

(b) Department 4, II Year; 1 hour per week, both terms.

This course of lectures includes a discourse on the literature which refers either directly or indirectly to architecture and the arts. Books are reviewed and discussed in round-table talks and essays prepared for practice in expression. The preparation of specifications and contracts for the execution of construction is continued from the course in the first year, specializing in architectural types.

123. *Economics and Finance*:—C. R. Fay.

All Departments, II Year; 1 hour per week, both terms.

An introduction to the study of Economics. The course will deal in an elementary fashion with the following:

- (1) Scope and Method of Economics.
- (2) Theory of Value and Distribution.
- (3) Structure of Industry and Social Conditions.
- (4) Money, Banking and Public Finance.

Text Book:—Economics for the General Reader—Clay.

124. *Commercial Law*:—A. R. Clute.

All departments, III Year; 1 hour per week, both terms. General Principles of the Law of Contracts, Principal and Agent, Partnership and Limited Companies (with special reference to the Companies Acts). General view of the following:—Negotiable Instruments, Sale of Goods, Bills of Sale and Chattel Mortgages, Suretyship and Guarantee.

Text-Book:—Stephens' Elements of Mercantile Law (5th Ed., 1911.)

125. *Engineering Economics*:—C. R. Young.

Departments 1, 3, 7, 8, IV Year; 1 hour per week, second term.

A series of lectures on the principles by which the economic practicability of a project is judged and the comparison of competing proposals is made. Consideration is given to first cost and annual cost, methods of estimating, fixed charges and operating expenses, valuation and appraisals. Special attention is given to depreciation and the methods of providing for it, as well as to its relation to amortization. Typical numerical problems are discussed and solved.

Text Books:—Engineering Economies—Fish; Financial Engineering —Goldman.

126. *Engineering Law*:—R. E. Laidlaw.

Department 1, IV Year; 1 hour per week, first term.

A course of lectures, co-ordinating Engineering practice and Law as contained in various legislation such as: The Railway Act, Municipal Act, Public Health Act, Arbitration Act, Workmen's Compensation Act, Patents, Copyrights, etc.

127. *Contracts and Specifications*:—C. R. Young.

Departments 1, 4, 8, IV Year; 1 hour per week, second term.

This course of lectures deals with the fundamental principles of contract and specification writing. The critical examination of typical specifications and agreements by the class, forms an essential feature of the instruction.

Text Books:—Engineering Contracts and Specifications—Johnson; Elements of Specification Writing—Kirby.

128. *Management*:—C. R. Young.

Department 1, IV Year; 1 hour per week, first term.

A series of lectures dealing with the fundamental principles upon which management is based. The possibilities of effective management are indicated and its basis is shown to exist in suitable organization, adequate equipment and smooth administration. Consideration is given to such matters as selection of personnel, essentials of effective organization for enterprises of widely different character and the art of directing a force so as to attain a desired end in an expeditious and effective manner.

Text Books:—Construction Cost Keeping and Management—Gillette and Dana; Principles of Industrial Organization—Kimball; Administration of Industrial Enterprises—Jones.

129. *Plant Management*:—G. A. Guess.

Department 8, IV Year; 1 hour per week, first term.

A course of twelve lectures dealing with some phases of labour, plant organization, smelter contracts and markets.

130. *Industrial Management*:—E. A. Allcut.

Departments 3 (Option c), 6 and 7, IV Year; 1 lecture per week, both terms.

This course includes a study of industrial organization, location, arrangement, construction and equipment of industrial plants for efficiency and economy, process routing, scheduling work, reports, methods of superintending, employment, systems of compensating labour and systems of distributing indirect expenses.

131. *Railway Economics*:—W. M. Treadgold.

Department 1, Option e, IV Year; 2 hours per week, both terms.

The object of this course is to make the student acquainted with the general principle of railroad engineering and the following branches of the subject will be discussed—economic theory of location, train resistance, effect of grade, distance and curvature, rise and fall, maintenance of way, yards and terminals, tunnels and street railway practice.

132. *Municipal Administration*:—P. Gillespie, A. T. Laing.

Department 1, Option b, IV Year; 1 hour per week, both terms.

A course of lectures dealing with civics, local improvement laws and assessments, building codes, fire control, transportation, public utilities, etc.

133. *Public Speaking*:—W. H. Greaves.

Department 1, III Year; 1 hour per week, first term.

A course on the principles of public speaking and the means of expression accompanied by practical application and training in actual speaking.

## ELECTRICITY

**135. Electricity:**—H. W. Price.

Departments 1, 2, 3, 6, 7 and 8, I Year; 2 hours per week, both terms. A course of lectures on basic principles relating to electric circuits, magnetic circuits, instruments and apparatus in general, distribution of electrical energy, etc., illustrated largely from commercial apparatus. The point of view of this work is quantitative rather than descriptive, for it is believed that men who can solve engineering problems are most likely to grasp underlying principles.

**136. Electricity:**—W. S. Guest.

Departments 3, 6, 7 and 8, II Year; 2 hours per week, both terms. Deals with the theory of electrical measurements, and detailed study of various methods applicable under different conditions in engineering practice to the measurement of resistance current, potential difference, power and energy; calibration of commercial measuring instruments. The effect of choice of conditions of measurement on the accuracy of the result is considered.

**137. Electrical Laboratory:**—W. S. Guest.

Departments 3, 6, 7 and 8, II Year; 3 hours per week, both terms.

This laboratory course is closely associated with the lecture course 136 on electricity for the second year. The more important and useful methods of testing generators and circuits for electromotive force, resistance, current, grounds, etc., are practiced, often under conditions such as occur in practice. The work also includes methods of calibration of measuring instruments for voltage, current, power and energy, and certain studies of properties of incandescent lamps.

**138. Magnetism and Electricity:**—A. R. Zimmer.

Department 3, III Year; 2 hours per week, first term.

Department 7, III Year; 2 hours per week, first term; 1 hour per week, second term.

A course of lectures on theory of magnetism and magnetic circuits, theory of direct-current generators, motors, etc.

**139. Alternating Current:**—A. R. Zimmer.

Department 3, III Year; 1 hour per week, both terms.

Department 7, III Year; 1 hour per week, first term; 2 hours per week, second term.

A first course of lectures on alternating current, covering principles of measurement and leading to the analytical and graphical treatment of the simpler problems relative to alternating-current circuits and machinery.

**140. Electrical Laboratory:**—A. R. Zimmer.

Department 3, III Year; 3 hours per week; Department 7, III Year; 6 hours per week.

This laboratory course is intended to afford the student an opportunity to become familiar with principles involved in continuous-current shunt, series and compound-wound generators and motors, and, to some extent, alternating-current circuits and machinery. Other sections of the work deal with the magnetic properties of iron and steel, and study of iron losses in transformers and generators.

The course is arranged to stand in close relation to the lecture courses in the subjects of magnetism and electricity and alternating current (138, 139) for III Year, and to certain design work (141).

**141. Electrical Design:**—H. W. Price.

Department 7, III Year; 1 hour per week.

A course of lectures dealing with design of electrical apparatus and machinery, accompanied by designs to be worked out in the design room.

**142. Electrical Design:**—H. W. Price.

Department 7, III Year; 3 hours per week

A design room is set apart for working out designs of electrical apparatus such as transformers, generators, motors, auxiliary apparatus, etc.

Special forms and notes are employed, arranged to suit the various studies. Certain models are provided to assist where necessary.

**143. Electricity:**—H. W. Price.

Departments 1, 2 and 8, III Year; 1 hour per week, both terms.

A continuation of Course 135, First Year, adapted to the requirements of non-electrical students. It deals with problems on direct-current circuits and apparatus; magnetic circuits; power measurements; alternating current principles and machinery; transmission; power-plants, etc.

**144. Electrical Laboratory:**—H. W. Price, A. R. Zimmer.

(a) Department 1.

III Year; 3 hours per week, first term.

IV Year; Options d and e, 3 hours per week, second term.

(b) Department 2.

IV Year; 3 hours per week, first term.

(c) Department 3.

IV Year; 3 hours per week, second term.

(d) Department 6.

III Year; 3 hours per week, first term.

(e) Department 8.

III Year; 3 hours per week, both terms.

These courses are arranged to suit the requirements of the departments concerned. The experiments are planned with the idea of affording a general knowledge of circuits, power measurements, direct-current and alternating current machinery and transmission of power.

- 145. *Applied Electricity:***—(a) Symbolic and Graphical Methods,  
 (b) Wave Form and Transmission Line—T. R. Rosebrugh.

Department 7, IV Year; 2 hours per week.

- (a) Complex quantities and their use in a.c. problems. Loci for current and voltage vectors for given limitations on circuit constants. Short line distribution circuit loci; approximate graphical theory of synchronous motor.  
 (b) Non-sinusoidal alternating current waves, analysis of waves, forms of symmetry, three phase limitations, elimination of undesired harmonics, heating of rotary converters from combined a.c. and commutated d.c. waves, power, current, and voltage readings as influenced by wave form.

Long distance transmission line; principles and calculation. Unequal lines in tandem and in parallel.

*Applied Electricity, (c) A.C. Machinery and Measurements:*—H. W. Price.

Department 7, IV Year; 2 hours per week.

Polyphase alternating-current measurements of power, reactive power, apparent power, finding the indications of meters from given wiring diagrams, constructing wiring diagrams to obtain required meter indications. Potential and current transformers. Meter indications with distorted wave forms. Power transformers. Properties of alternators; induction motors of squirrel cage and wound-rotor types; synchronous motors; regulators; current-limiting reactors; arresters; and other general apparatus.

- 146. *Electrical Laboratory:***—A. R. Zimmer.

Department 7, IV Year, in connection with 145; 20 hours per week.

This laboratory course involves a thorough study of principles and properties of single and polyphase circuits and apparatus. Both vector and analytical methods are applied to the solution of problems based on tests made on laboratory machines.

The work deals mainly with constant-voltage and constant-current transformers, single and polyphase alternators, synchronous motors, rotary converters, induction and single phase commutating motors, transmission line, etc. The work does not consist only of factory tests, but is designed to lead the student to apply theory to practice as illustrated in the apparatus under test, with a view to an exact understanding of methods and an appreciation of limitations under many conditions. Free use is made of the oscillograph as a necessary device for "seeing" conditions under investigation. The best commercial measuring instruments are available.

147. *Radiotelegraphy*:—T. R. Rosebrugh.

Department 7. Option *r*, IV Year, in connection with 148; 2 hours per week.

Natural oscillations of simple and simply coupled circuits. Action of C.W. on circuits of the most general character. Radiation of antennas. Theory of modulation in radiotelephony. Energy control and transformation by vacuum tubes.

148. *Radiotelegraph Laboratory*:—W. C. C. Duncan.

Department 7. Option *r*, IV Year, in connection with 147; 9 hours per week.

The work in this laboratory covers the principles and the technique of measurements at radio frequencies. This includes measurements of wave length, resonance, coupled circuits, inductance, capacity, energy distribution, resistance, etc., at radio frequencies.

Considerable work is also done with the three electrode vacuum tube and its uses in radio and audio-frequency circuits.

## ENGINEERING DRAWING AND DESCRIPTIVE GEOMETRY

160. *Descriptive Geometry*:—J. R. Cockburn.

Departments 1, 2, 3, 6, 7 and 8, I Year; 1 hour per week; both terms. This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solutions of problems relating to straight lines and planes.

161. *Descriptive Geometry*:—J. R. Cockburn.

Department 4, I Year; 1 hour per week; both terms.

This course of lectures deals chiefly with the principles of orthographic and oblique projections and the application of such principles to the solution of problems relating to straight lines and planes, special reference being made to the determination of shades and shadows.

162. *Descriptive Geometry*:—J. R. Cockburn.

Departments 1, 2, 3 and 7, II Year; 1 hour per week, both terms.

This course of lectures is a continuation of the work taken in the first year with the following additions: Problems relating to curved surfaces, principles of shades, shadows and perspective.

163. *Descriptive Geometry*:—J. R. Cockburn.

Department 4, II Year; 1 hour per week, both terms.

This course of lectures is a continuation of the work taken in the First Year with the addition of problems relating to curved surfaces, shades, shadows and perspective.

**164. Descriptive Geometry:**—J. R. Cockburn.

Department 1, III Year; 1 hour per week, first term.

This course of lectures deals with spherical projections, the principles of mapmaking, and the graphical solution of spherical triangles.

**165. Descriptive Geometry:**—J. R. Cockburn.

Department 4, III Year; 1 hour per week, first term.

Advanced work in shades, shadows and perspective.

**166. Engineering Drawing:**—J. R. Cockburn.

Departments 1, 2, 3, 7 and 8, I Year; 11 hours per week, first term; 18 hours per week, second term.

Copying from the flat, lettering, topography; graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; the plotting of original surveys; measured drawings.

**167. Architectural Drawing:**—J. R. Cockburn, H. H. Madill.

Department 4, I Year; 9 hours per week first term; 18 hours per week, second term.

Copying from the flat, lettering, rendering the graphical solution of problems in statics; problems in descriptive geometry, relating to both orthographic and oblique projections; measured drawings. Elements and principles of Architecture.

**168. Engineering Drawing:**—J. R. Cockburn.

Department 6, I Year; 4 hours per week, both terms.

Copying from the flat, lettering, graphical solution of problems in statics, problems in descriptive geometry

**169. Engineering Drawing:**—J. R. Cockburn.

Departments 1 and 2, II Year. Department 1,  $4\frac{1}{2}$  hours per week, first term;  $13\frac{1}{2}$  hours per week, second term. Department 2, 3 hours per week first term; 12 hours per week, second term.

Colouring and shading as applied to both topographical and construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics and strength of materials; measured drawings; elementary design.

**170. Engineering Drawing:**—J. R. Cockburn.

Departments 3 and 7, II Year; Department 3, 13 hours per week, first term; 11 hours per week second term; Department 7, 12 hours per week, both terms.

Coloring and shading as applied to construction drawings; problems in descriptive geometry relating to solids bounded by curved surfaces; principles of shades, shadows and perspective; solution of problems in optics, theory of mechanism and strength of materials; measured drawings; elementary design.

171. *Architectural Drawing*:—J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.  
 Department 4, II Year; 17 hours per week, both terms.  
 Exercises from the orders of architecture; principles of shades, shadows and perspective; elementary architectural design; problems in descriptive geometry relating to solids bound by curved surfaces; solution of problems in optics and strength of materials; measured drawings.
172. *Engineering Drawing*:—J. R. Cockburn.  
 Department 6, II Years; 7 hours per week, first term; 3 hours per week, second term.  
 Department 8, II Year; 3 hours per week, first term; 6 hours per week, second term.  
 (Same as Department 3 with the exception that Dept. 6 has no descriptive geometry.)
173. *Engineering Drawing*:—J. R. Cockburn, C. R. Young.  
 Department 1, III Year; 15 hours per week first term; 12 hours per week, second term.  
 Principles of mapmaking, spherical projection, plotting of original surveys relating to topographical and railway work; problems in theory of construction; original design of various structures; measured drawings.
174. *Engineering Drawing*:—J. R. Cockburn.  
 Department 2, III Year; 9 hours per week, first term.  
 Plotting of original surveys, relating to topographical and railway work and mining; problems in theory of construction; original design; measured drawings.
175. *Architectural Drawing*:—J. R. Cockburn, A. Wellesley McConnell, H. H. Madill.  
 Department 4, III Year; 18 hours per week, both terms.  
 Architectural design; advanced work in monochrome and colours; problems in shades, shadows and perspective; problems in theory of construction, including framed structures.
176. *Architectural Drawing*:—J. R. Cockburn.  
 Department 4, III Year; 1 hour per week, first term.  
 Advanced work in shades, shadows and perspective.
177. *Engineering Drawing*:—J. R. Cockburn, C. R. Young.  
 Departments 3, 6 and 8, III Year; Department 3, 9 hours per week, first term; Department 6, 6 hours per week, first term; Department 8, 3 hours per week, first term.  
 Problems in design dealing with the theory of structures.
178. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Department 1, IV Year; 22 hours per week, both terms.  
 Problems in structural design.

179. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Department 1b, IV Year; 5 hours per week, second term.  
 Department 1d, IV Year; 4 hours per week, first term; 8 hours per  
 week, second term.  
 Department 1e, IV Year; 6 hours per week, both terms.  
 Problems in structural design.
180. *Structural Design Drawing*:—C. R. Young, W. J. Smither.  
 Department 3, IV Year; 3 hours per week, both terms.  
 Problems in mill building design.
181. *Structural Design Drawing*:—P. Gillespie, W. J. Smither.  
 Department 3, IV Year, Option (b); 3 hours per week, both terms.  
 Problems in reinforced concrete design.

### ENGINEERING PHYSICS

185. *Illuminating Engineering and Optics*:—G. R. Anderson.  
 Departments 1, 3, 6, 7, I Year.  
 Rectilinear propagation of light, illumination, photometry, light standards. Distribution of light by reflectors and diffusers, general and selective absorption, economic values of artificial lights. Illumination calculations.  
 Laws of reflection and refraction, theory of optical instruments.  
 Light considered as wave motion, dispersion, spectrum analysis, colour phenomena, polarization.  
 Lectures and laboratory work, both terms.
186. *Hydrostatics*:—G. R. Anderson.  
 Departments 1, 3, 6, 7, II Year.  
 Laws of fluid pressure and application to machines. Density of solids, and fluids, theory of flotation.  
 Lectures and laboratory work. Spring term.
187. *Heat*:—G. R. Anderson.  
 Departments 1, II Year.  
 Generation and propagation of heat. General and industrial thermometry, calorimetry and pyrometry. Linear and cubical expansion, gas laws. Specific heat of solids, liquids and gases, latent heat of fusion and vaporization. Mechanical equivalent of heat. Carnot cycle.  
 Lecture and laboratory work, Fall term.
188. *Photography*:—G. R. Anderson.  
 Department 1, II Year.  
 The camera and its adjustments, lenses, shutters, screens. Plates for various purposes, films, prevention of halation. Lighting, exposure, development. Paper of various kinds, printing, enlarge-

ment and reduction, blue printing and allied processes. Record photography, photogrammetry and photo-surveying. Photography in colour.

Lectures Fall term, and laboratory work both terms.

189. *Illumination*:—G. R. Anderson.

Department 4, II Year.

Principles of interior and street illumination. Artificial lighting of public and private buildings, etc.

190. *Acoustics*:—G. R. Anderson.

Department 4, III Year; Department 7, IV Year.

Wave motion, propagation, reflection and transmission of sounds.

Laws of vibrating strings, pipes and forks. Velocity of sounds.

Musical scales. Absorption of sound by various substances, use of deadening material in buildings. Amount of reverberation permissible and desirable in public buildings. Lectures and laboratory work.

191. *Photographic Surveying*: G. R. Anderson.

Department 1a, IV Year; 1 hour lecture and 2 hours laboratory, first term.

This course presupposes a general knowledge of photographic processes as given in the second year. Treatment of a photograph as a perspective drawing from which plan and elevation to scale may be obtained under certain conditions. The intersection method of photographic surveying, its advantages and limitations. The stereoscopic method with its advantages and disadvantages. Method of plotting. Accuracy of results.

## GEOLOGY

193. *Field Work*:—E. S. Moore.

Department 2, III Year; one week preceding the opening of the first term.

194. *Pleistocene Geology and Physiography*:—A. MacLean.

Department 2, IV Year; 1 hour per week, both terms.

*Pleistocene Geology*.—Lectures on the formation and distribution of the drift deposits of North America, with brief references to other regions. Glacial, Interglacial, and Postglacial beds are described, changes of climate are discussed with their probable causes, and the economic features of the clays, sands, and gravels are pointed out. A weekly excursion is made during October and November to points of interest near Toronto, which is the centre of the most important development of the Pleistocene in America.

*Physiography.*—A course of lectures on the surface forms of the earth, with the geological factors which have produced them. The broad features of the earth, its plains, tablelands, hills, valleys, mountains, oceans, rivers, and lakes are discussed in a general way; methods of topographical surveying and mapping are referred to, and the chief physiographic areas of Canada are described.

195. *Elementary Geology:*—W. A. Parks.

Departments 1, 2, II Year; 2 hours per week, second term.

This course deals chiefly with historical geology with special reference to Canadian formations.

Works of Reference:—Introduction to Geology—Scott; Elementary Geology—Coleman and Parks.

196. *Geology and Ore Deposits:*—A. MacLean.

Department 8, II Year; 2 hours per week, both terms.

Lectures and laboratory work on historical, structural, and economic geology, designed to familiarize the student with the more important principles, facts, and terms of general geology.

Works of Reference:—As in Course 195.

197. *Engineering Geology:*—A. MacLean.

Department 1, III Year; 1 hour per week, both terms.

This course deals with the application to engineering of dynamic, structural, and economic geology.

Works of Reference:—Engineering Geology—Ries and Watson.

198. *Dynamic and Structural Geology:*—A. MacLean.

Department 2, III Year; 1 hour per week, first term.

Lectures on geological forces and their effects. Particular attention is given to those aspects of the subject which apply in mining.

199. *Precambrian Geology:*—E. S. Moore.

Department 2, IV Year; 2 hours per week, first term.

Lectures on the Precambrian formations of Canada—their rocks, distribution, relationships, and economic features. Briefer accounts are given of similar formations in the United States and elsewhere.

Works of Reference:—Reports of the Geological Survey of Canada and of the Ontario Department of Mines; Reports of the United States Geological Survey.

200. *Mining Geology:*—E. S. Moore.

Department 2, IV Year; 2 hours per week, second term.

A course of lectures on geological problems associated with mining, typical mining regions in Canada, the United States, and elsewhere being discussed from the geological side.

Works of Reference:—Mineral Industry; Ore Deposits of United States and Canada—Kemp; and the works mentioned under Course 199.

201. *Geological Excursions*:—The Staff in Geology.

Department 2, IV Year.

During October and November weekly trips will be made to points of interest near Toronto.

202. *Economic Geology*:—E. S. Moore.

Department 2, III Year.

(a) *Ore Deposits*: 1 hour per week, both terms.

Discussion of the origin and classification of ore deposits, the mode of occurrence of the chief ores, and statistics of production. Special attention is given to the metals mined in Canada.

(b) *Economic Geology of the Non-metals*: 2 hours per week, second term.

Lectures on the origin and mode of occurrence of the valuable non-metallic substances—coal, oil, building stone, gypsum, cement materials, etc.

Works of Reference:—Economic Geology—Ries; General Economic Geology—Emmons; Ore Magmas—Spurr; Coal—Moore; Practical Oil Geology—Hager.

203. *Economic Geology*:—E. S. Moore.

Department 2, III Year; 2 hours per week, second term.

Laboratory work on ores, manner of occurrence, vein structure, etc., also the examination and construction of geological maps and sections of typical mining regions.

204. *Special Geology*:—A. MacLean.

Department 1, Option e, IV Year; 1 hour lecture and 1½ hour laboratory work per week, second term.

A lecture and laboratory course on superficial geology, physiographic control, water geology, etc.

Works of Reference:—Political and Commercial Geology—J. E. Spurr.

## HYDRAULICS

205. *Hydraulics*:—R. W. Angus.

Departments 1, 2, 3, 6, 7, III Year; 2 hours per week, both terms.

This is a course of lectures in hydraulics devoted to the development and discussion of formulae relating to the flow of water in pipes, the measurement of discharge by various methods, such as orifices and weirs, the conditions of flow obtaining in open channels, artificial and natural, and in pipes flowing partially full, together with other kindred subjects.

The object of this course is to provide the student with a good working knowledge of the fundamental principle of hydraulics, such as is useful in practical work, and is necessary to the intelligent investigation of more advanced problems, such as the design of water supply, sewerage and irrigation system, and water power plants.

206. *Hydraulic Laboratory*:—R. W. Angus, R. Taylor.

Departments 1, 3, III Year; one 3 hour period per week, second term.  
Departments 6, 7, III Year; 4 periods of 3 hours each.

The work in this course is intended to illustrate the lecture course given in hydraulics and to give the student some working acquaintance with the formulae met with in practice. Experiments are made to determine the coefficients for orifices of the various types used in practice and for a weir. The results of these experiments are used in measuring the discharge in subsequent experiments on meters and for the determination of hydraulic resistances in various cases of flow in pipes. The complete course illustrates very fully the application of the course of lectures to actual cases.

207. *Hydraulics*:—R. W. Angus.

Departments 1, 3, 7, IV Year; 1 lecture per week, both terms.

A course of lectures dealing with the various problems of unsteady flow such as occurs in power lines, penstocks, etc. Much of the work is done by the process of arithmetic integration, and the lecture work is supplemented by problems solved by the students in the work rooms, the time for which is included in course 209. Surges, water hammer, stream flow data, etc., are discussed.

The problems of collection of water for power purposes, use of the mass curve, rainfall and evaporation, turbine governing, etc., are also treated.

208. *Hydraulics*:—R. W. Angus.

Departments 1, 3, 7, IV Year; 2 lectures per week, both terms.

The most important question considered and to which most of the lectures are devoted is the theory of turbines and centrifugal pumps, the effect of the design on the speed, discharge and efficiency being fully taken up. The course includes the selection of turbines and pumps for given service intakes, draft tubes and all matters connected with hydraulic power plants.

Text Book:—Water Power Engineering—Mead.

209. *Hydraulics*:—R. W. Angus, R. Taylor.

Departments 1, 3, 7, IV Year; about 10 hours per week in 3 hour periods, both terms; Department 3, Option (c), first term only.

A laboratory course devoted to experimental work on turbines of various types and centrifugal and turbine pumps and other similar devices. This experimental work is arranged to illustrate the lectures on turbine and pump design. The experiments are made on two large turbine pumps used in the laboratory supply, as well as on apparatus specially designed for instruction. Various methods of measuring water-power and the efficiency of machines are also given. A list of the equipment now available, and which is used in this course, is given at the end of the Calendar.

210. *Hydraulic Laboratory*:—R. Taylor.

Departments 2, 8, IV Year; 3 hours per week, second term.

A laboratory course of experiments on orifices, weirs and meters.

211. *Hydraulics*:—R. Taylor.

Department 1<sub>b</sub>, 1<sub>e</sub>, IV Year; one hour lecture per week, first term.

A laboratory course of 3 hours per week, first term, on measurement of water, flow in open channels and on pumps.

212. *Hydraulics*:—R. Taylor.

Department 3, IV Year, Option (c); one hour lecture per week, both terms.

A lecture course on pumps and other hydraulic machinery.

## HEAT ENGINES

216. *Steam Engines*:—E. A. Allcut.

Departments 3 and 7, II Year; 1 lecture per week, both terms.

Departments 2 and 8, II Year; 1 lecture per week, first term.

This course of lectures includes a discussion of the history and development of the steam engine and the functioning of its various component parts. Special attention is given to the theory and design of valves and valve operating mechanisms.

217. *Thermodynamics*:—E. A. Allcut.

Departments 3, 6 and 7, III Year; 2 lectures per week, both terms.

In this lecture course the laws of heat are used to develop the characteristic equation for a perfect gas and the use of thermal lines on the pressure-volume diagram. The properties of Carnot's cycle are then considered, followed by application of these principles to the hot-air engine, internal combustion engine and air compressor. A consideration of the properties of vapours and their application to the steam engine cycle concludes the course.

218. *Heat Engines*:—E. A. Allcut.

Department 3, III Year; 2 lectures per week, both terms.

Departments 7 and 8, III Year; 1 lecture per week, both terms.

The course in Heat Engines is intended to supplement the general lecture course in Thermodynamics by showing the practical

applications of the laws discussed therein. A general consideration of the laws of combustion and heat transmission is followed by their application to boiler practice. Details of steam, gas and oil engines are described and the lectures are arranged as far as possible to supplement the information obtained in the laboratory course 219.

219. *Thermodynamics and Mechanical Laboratory*:—R. W. Angus, E. A. Allcut, H. A. Tuttle.

Department 3, III Year; one 3 hour period per week, both terms.

Department 7, III Year; 2 hours per week, first term;  $1\frac{1}{2}$  hours per week, second term. Time to be in three-hour periods.

This laboratory course is designed to assist in a clearer understanding of thermodynamics, machine design and mechanics of machinery. The work in thermodynamics consists in the setting of slide valves, indicating engines measuring the brake horse-power, simple engine and boiler tests and the testing of gas and gasoline engines under various conditions. The mechanical laboratory work deals with the efficiency of belts as well as of several machines of simple construction. An examination of lubricating oils is also made by means of well-known methods. Experiments are also made on the balancing of reciprocating and rotating masses.

220. *Thermodynamics*:—E. A. Allcut.

Departments 3 and 7, IV Year; 2 lectures per week, both terms.

This is a continuation of course 217, the general thermodynamic theory being studied from the conception of the thermodynamic surface. The theory of the flow of gases and vapours through orifices, nozzles and pipes is then discussed and its application to the various forms of turbines is outlined. Following this, the principles of refrigeration, binary fluid engines and internal combustion are dealt with.

221. *Heat Engines*:—E. A. Allcut.

Departments 3 and 7, IV Year; 1 lecture per week, both terms.

This course is a continuation of the lectures on heat engines given in the Third Year, with special application to the steam power plant. The causes of the various losses occurring in steam engines and the considerations that influence them are studied in detail. Special attention is given to condensing plants, consumption records and other factors upon which the efficiency of a power plant depends.

222. *Thermodynamics*:—R. W. Angus, E. A. Allcut, H. A. Tuttle.

Departments 3 and 7, IV Year; about  $9\frac{1}{2}$  hours per week, in 3 hour periods.

The work in this year is a continuation and extension of the work covered in the third year laboratory course. Careful tests are made of engines of various types, such as simple, tandem and

cross-compound steam engines; steam turbine; refrigerating machine; injectors and steam pumps, etc.; and an application is made of Hirn's analysis and the entropy diagram to the results obtained. A complete set of experiments is made on each machine and the result plotted so as to show clearly to the student the effect of various alterations in the adjustment of the engine on the resulting efficiency.

Several modern gas and gasoline engines give ample opportunity for the study of this type of engine, and facilities are provided for sampling the gas supply and exhaust.

Two experimental stacks and three boilers enable results to be obtained on boiler efficiency and chimney draft.

**223. Thermodynamics:**—E. A. Allcut.

Department 1, III Year; 1 lecture per week, both terms.

Departments 2 and 8, IV Year; 1 lecture per week, both terms.

The general principles of thermodynamics, the properties of a perfect gas and their application to the Carnot cycle are first studied. This is followed by a consideration of the air compressor cycle, some details of air compressor operation and the theory of the flow of air through pipes and orifices. The properties of vapours and the principles of steam engine operation are also discussed.

**224. Thermodynamic Laboratory:**—H. A. Tuttle.

Departments 1 and 6, III Year; 7 three-hour periods; Departments 2 and 8, IV Year; 3 hours per week, first term.

A course of experiments with steam and gas engines, compressed air, etc.

**225. Motive Power:**—R. W. Angus.

Department 1, Option e, IV Year; one hour per week, both terms.

A course of lectures covering boiler capacity, locomotive horse-power, tractive effort, etc., necessary to carry specified trains over different conditions of roadbed.

**226. Heating and Ventilation:**—J. H. Parkin.

Department 3, IV Year; Option (c); one hour per week, bot terms. This course is designed to give a working acquaintance with the essential engineering principles underlying the practice of heating and ventilation work.

**227. Refrigeration:**—J. H. Parkin.

Department 3, IV Year; Option (c); one hour per week, both terms.

A course covering the principles underlying mechanical refrigeration, physical properties of different refrigerants, and a study of the various standard types of refrigerating machines and systems.

**228. Thermodynamics Laboratory:**—H. A. Tuttle.

Department 3, IV Year, Option (c); three hours per week, both terms.

A laboratory course on heating, ventilation, refrigeration, etc.

## MACHINERY

- 230. Theory of Mechanism:**—J. H. Parkin.

Departments 2, 3 and 7, II Year; lectures 2 hours per week; problems 1½ hours per week, both terms.

This course of lectures treats of the elementary construction of machines and of the motions of the various parts. Methods of determining linear and angular velocities, methods for the solution of elementary problems involving forces and methods for the determination of the mechanical efficiency of machines are discussed. Velocity diagrams, crank effort and torque diagrams are plotted. Cams, toothed gearing and various types and applications of trains of gearing are considered.

Applications of the methods described are made to various machines including engines, machine tools, link motions, etc., and the lecture work is followed up by the solution of numerous examples in the drafting room.

Text Book:—Theory of Machines—Angus.

- 231. Mechanics of Machinery:**—J. H. Parkin.

Departments 3 and 7, III Year; 1 hour per week, both terms.

This course is devoted to a consideration of the speed regulation and balancing of machines, and comprises lectures on the theory of various forms of governors, kinetic energy of machines and determination of speed fluctuations, the proper weight of flywheel, acceleration and inertia effects, and balancing.

The methods of analysis employed are those developed in course 230.  
Text Book:—Theory of Machines—Angus.

- 232. Elementary Machine Design:**—U. C. Holland.

Departments 3, 6 and 7, II Year; 1 hour per week, both terms.

This is a preparatory course intended to familiarize the student with the different shop methods and processes, casting, forging, machining, etc., used in the production of machine parts, to enable him to make proper provision in the design of such parts to facilitate their production.

In addition, the various standards, machine and pipe threads, tapers, pipe fittings, etc., are described and mechanical drafting room practice explained.

Tolerances, limits, fits and gauges are discussed.

The design of simple machine fastenings and parts is taken up and examples worked out in the drafting room.

- 233. Machine Design:**—J. H. Parkin and U. C. Holland.

Departments 3 and 7, III Year; 2 lectures per week, both terms.

The design work averages 7 hours per week for Department 3, and 4 hours per week for Department 7, the periods to be of not less than 2 hours' duration.

The lectures in this course deal with the design of various machine elements, including shafting, bearings (journal, thrust, ball and roller), belts, pulleys, fly-wheels, clutches, springs, machine frames, etc.

The problems worked out in the drafting room are planned to include the design of all of the above and with a view to developing the student's judgment and sense of proportion in design.

Text Book:—Machine Design—Leutwiler.

234. *Machine Design*:—J. H. Parkin and U. C. Holland.

Department 6, IV Year; Department 8, III Year; 1 lecture per week, both terms.

The design work occupies 3 hours per week for the second term only.

The lectures in this course deal with the design of various machine elements, particularly those likely to be met with in Chemical and Metallurgical plants.

The problems worked out in the drafting room are designed to give the student training in the general lay-out of shafting and plant machinery, as well as in the design of simple parts for chemical and metallurgical apparatus.

Text Book:—Machine Design—Leutwiler.

235. *Advanced Machine Design*:—J. H. Parkin and U. C. Holland.

Department 3, IV Year; 2 lectures per week in the first term, 1 lecture per week in the second term.

The design work averages  $6\frac{1}{2}$  hours per week for Option (a), 6 hours per week for Option (b) and 7 hours per week for Option (c), the periods to be of not less than 2 hours' duration.

The work of this course is devoted to the design of complete machines with the object of giving the student practice not only in the design of various details, but also in working in the various elements into a machine of smooth and harmonious design. The machines chosen as examples for design involve as many new machine elements as possible in order to broaden the training of the student.

Text Book:—Machine Design—Leutwiler.

## MATHEMATICS

236. *Calculus*:—A. T. DeLury.

All Departments, I Year; 2 hours per week, each term.

Treatment of limits with special reference to those pertaining to exponentials and logarithms. Derivation of the fundamental formulae of the differential and integral calculus, with early application to simple problems concerning graphs, areas, volumes, lengths, etc.

237. *Calculus*:—S. Beatty and J. L. Synge.

Departments 1, 3, 6 and 7, II Year; 1 hour per week, both terms.

Continuation of course 236. The elementary theory reviewed and extended. Special attention to applications with problems in Engineering mostly in view.

238. *Analytical Geometry*:—I. R. Pounder.

All Departments, I Year; 1 hour per week, first term, 2 hours per week, second term.

The course in Elementary Analytical Geometry covers the more familiar propositions in connection with the straight line, circle, parabola, ellipse and hyperbola. The subject is treated so as to illustrate the general methods of analytical geometry.

239. *Trigonometry, Spherical*:—L. B. Stewart.

Department 1, II Year; 1 hour per week, first term.

A course of lectures includes the derivation of formulæ and their application to the solution of triangles and to practical problems.

Text Book:—*Spherical Trigonometry*—Todhunter and Leatham.

240. *Least Squares, Method of*:—L. B. Stewart.

Department 1, III Year; 1 hour per week, second term.

The course of lectures includes: The general principles of probability, the law of error, direct measurements of equal and different weights; mean square and probable errors; indirect measurements; conditioned observations; applications to empirical constants and formulæ, etc.

Text book:—*Least Squares*—Merriman.

## METALLURGY

241. *Elementary Metallurgy*:—G. A. Guess.

Departments 1, 2, 3, 6 and 8, II Year; 1 hour per week, second term.

A course of about 12 lectures on furnace metallurgy and present practice, with special reference to iron and steel.

242. *Fuels and Combustion*:—G. A. Guess.

Department 8, II Year; 1 hour per week, both terms.

A lecture course dealing with fuels, their use, preparation, calorific value and combustion.

243. *Metallurgy*:—G. A. Guess.

Departments 2, 6, III Year; 1 hour per week, both terms.

Fuels, temperature of combustion, specific heat, conductivity and problems thereon; chimneys, furnaces, refractories, outline of furnace metallurgy and hydro-metallurgy.

244. *Physical Metallurgy*:—O. W. Ellis.  
Departments 2, 3, 6 and 7, III Year; 2 hours per week, second term.  
The physical properties and structure of iron and steel and the more common alloys.
245. *Metallurgy*:—G. A. Guess, J. E. Toomer.  
Department 8, III Year; 2 hours per week, first term; 1 hour per week, second term.  
A lecture course on General Metallurgy accompanied by 3 hours laboratory per week, first term, and 6 continuous hours per week second term.
246. *Physical Metallurgy*:—O. W. Ellis.  
Department 8, III Year; 1 hour per week, both terms.  
Changes of phase and of state, pyrometry; preparation of alloys, miscibility of metals, binary, ternary and complex alloys, the use of the microscope, with 3 hours laboratory per week, first term.
247. *Metallurgy*:—G. A. Guess, J. E. Toomer.  
Departments 2 and 6, IV Year; 1 hour lecture per week, both terms; 6 continuous hours laboratory per week, second term.  
General metallurgy and metallurgical problems.
248. *Metallurgy Problems*:—G. A. Guess, J. E. Toomer.  
Department 8, IV Year; 2 hours lecture and 4 hours laboratory, both terms.  
Metallurgical book-keeping, balance sheets, thermal balance sheets, methods and processes.
249. *Metallurgy*:—G. A. Guess.  
Department 8, IV Year; 1 hour per week, both terms.  
Critical reading and discussion of papers and articles, describing metallurgical processes or dealing with plant arrangement and construction. Metallurgical flow sheets of typical plants.
250. *Physical Metallurgy*:—O. W. Ellis.  
Departments 6 and 8, IV Year; 1 hour lecture and 3 hours laboratory per week, both terms.
251. *Metallography*:—O. W. Ellis.  
Department 2, IV Year.  
A laboratory course of 3 hours per week, second term.
252. *Physical Metallurgy*:—O. W. Ellis.  
Department 1, IV Year; 1 hour per week both terms.  
The physical properties of metals and alloys used in Civil Engineering practice—specifications.

253. *Heat Treatment of Iron and Steel*:—O. W. Ellis.

Department 3, IV Year; 1 lecture per week, both terms.

Heat treatment of iron and steel, case carburizing, case hardening and malleableizing.

### MINERALOGY

255. *Elementary Mineralogy*:—J. E. Thomson.

Department 2, I Year; 2 hours per week, first term.

After introducing the student to the chief chemical, physical, and crystallographic characteristics of minerals, the course becomes descriptive and deals with about one hundred of the minerals most important from the industrial or scientific point of view.

Text Book:—Study of Minerals and Rocks—Rogers.

256. *Mineralogy*:—J. E. Thomson.

Departments 6 and 8, I Year; 3 hours per week, one term.

Introduction to determination of minerals by inspection and physical tests.

Text Book:—Mineral Tables—Eakle.

257. *Primary Mineralogy*:—A. L. Parsons.

Department 1, II Year; 2 hours per week, first term.

A very brief introduction to the study of minerals and rocks.

Text books:—Study of Minerals and Rocks—Rogers; Hand-Book of Rocks—Kemp.

258. *Mineralogy*:—J. E. Thomson.

Department 2, I Year; 1 hour per week, first term; 3 hours per week, second term.

Determination of minerals by inspection and by means of physical tests; introduction to blow-pipe practice.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

259. *Mineralogy*:—A. L. Parsons, J. E. Thomson.

Department 1, II Year; 1 hour per week, first term; 2½ hours per week, second term.

Determination of minerals by inspection and by means of physical tests; study of common rock types and their identification.

Text books:—Mineral Tables—Eakle; Handbook of Rocks—Kemp.

260. *Elementary Petrography*:—T. L. Walker.

Department 2, II Year; 1 hour per week.

A course of lectures and laboratory work introducing the student to the macroscopic study of rocks.

Text-books:—Handbook of Rocks—Kemp.

261. *Mineralogy*:—J. E. Thomson.

Department 2, II Year; 2 hours per week.

Determination of minerals by means of the blow-pipe and physical properties.

Text books:—Mineral Tables—Eakle; Determinative Mineralogy—Lewis.

262. *General Petrography*:—A. L. Parsons.

Department 2, III Year; 1 hour per week.

Study of the chief rock-forming minerals and of some phases of petrography not covered in the course of the previous year.

Text Books:—Minerals in Rock-Sections—Luquer; Petrology for Students—Harker.

263. *Petrography*:—T. L. Walker.

Department 2, III Year; 2 hours per week, both terms.

Study of the chief rock-forming minerals, of rocks in thin sections and in hand specimens.

Text books:—Petrology for Students—Harker; Minerals in Rock Sections—Luquer.

## MODERN LANGUAGES

266. *French*:—J. H. Cameron, Miss J. C. Laing, L. A. Bibet.

Required in Department 4, First Year; 2 hours per week, both terms; II and III Years, 1 hour per week, both terms.

*First Year*

(a) Practice in translation of a selected text bearing on some phase of architectural study (for example, History of Art, History of France, extracts from great French writers), this text being used as a basis for discussion on various aspects of the student's work.

(b) A course in Conversation to encourage the student to acquire a speaking knowledge of the language.

*Second Year*

(a) A reading course intended to introduce the student to the best literature on architectural subjects; prescribed text: *Gaudet: Éléments et théorie de l'architecture*, to which may be added other reading selected from time to time.

(b) Conversation course continued from I Year.

*Third Year*

A continuation and development of the work of the II Year.

267. *German*:—G. H. Needler, B. Fairley.

Required in Department 6, all years; 1 hour per week, both terms.

An elementary course intended to train the student in the **translation** of scientific journals and treatises.

268. *Spanish*:—M. A. Buchanan.

Departments 6, 8, II Year; 1 hour per week, both terms.

An introduction to Spanish grammar, pronunciation and practice in reading Engineering Spanish.

## PHYSICAL TRAINING

269. *Physical Training*:—G. D. Porter, D. M. Barton.

Required in all departments, I and II Years, and optional in the III and IV Years. Students in the I and II Years must be medically examined at the beginning of the session and are directed to the form of physical work most suitable to their requirements. Those classified as A1 may elect to take any form of competitive athletics during the season in which that form of sport is in progress.

Military training in the C.O.T.C. constitutes an option in Physical Training (see page 120).

## SURVEYING

270. *Surveying*:—S. R. Crerar.

Departments 1, 2, 3, 7 and 8, I Year; 1 hour per week, both terms. The lecture course includes the general principles; surveying with the chain, the compass and chain and the transit and chain, and level, the applications of trigonometry to inaccessible heights and distances; mensuration of surfaces, co-ordinate surveying, division of land, etc.

Text books:—Plane Surveying—Tracy; Theory and Practice of Surveying—Johnston and Smith; Elementary Surveying—Breed and Hosmer.

271. *Field Work*:—S. R. Crerar, J. W. Melson.

Departments 1, 2, 3, 7 and 8, I Year; 5 hours per week, first term. This course comprises testing chains; practice in chaining; a complete survey of a piece of land with the chain and transit; keeping of field notes; the use of the transit and compass in surveying closed figures and traverse lines and in ranging straight lines; plotting by latitudes and departures, and otherwise computing areas. Instrumental work with level, including roadway improvement.

272. *Surveying*:—W. M. Treadgold, E. W. Banting.

Departments 1 and 2, II Year; 1 hour per week, both terms.

This course of lectures takes up in detail, simple, reverse and compound curves as applied to railroad surveying. It also includes stadia, plane table and photographic surveying as applied to topographic work, and the main features of mine and hydrographic surveying.

Text books:—Henck, Searles, Allen (Field books for Engineers)  
 Theory and Practice of Surveying—Johnston and Smith; Surveying—Breed and Hosmer.

**273. Field Work:**—W. M. Treadgold, E. W. Banting.

Department 1, II Year; 9 hours per week, first term.

Department 2, II Year; 6 hours per week, first term.

This course of instruction embraces all adjustments of the transit and level, minor problems in triangulation and traversing—levelling and plane table practice.

**274. Surveying and Levelling:**—W. M. Treadgold.

Department 1, III Year; 1 hour per week, both terms.

This course of lectures takes up the work of the railroad engineer on construction, including profiles, cross sectioning, computation of volume of earthwork, overhaul, transition curves, laying out turnouts, frogs and switches, etc.

Also a discussion of trigonometric and barometric levelling.

Text books:—Field Engineering—Searles; Railroad Curves and Earthworks—Allen.

**275. Survey Camp:**—W. M. Treadgold, S. R. Crerar, E. W. Banting, J. W. Melson.

Departments 1 and 2, III Year.

This course includes:

- (a) Secondary Triangulation and Base Line Measurements.
- (b) Stadia, Plane Table and Boundary Traverses.
- (c) Highway and Railway Location.
- (d) Cross Sectioning and Computation of Earthwork.
- (e) Stream Gauging and Discharge Measurements.
- (f) Hydrographic Surveying.
- (g) Photographic and Micrometer work.
- (h) Stadia and Plane Table Topography.
- (i) Mine Surveying.
- (j) Observations for Time, Azimuth and Latitude. This work is taken at Gull Lake Camp. See page 31.

**276. Railroad Location and Design:**—W. M. Treadgold.

Department 1, Option "e," IV Year; 1 hour lecture per week, both terms; about 8 hours per week, both terms, in the drafting room.

This work will consist of an original survey for a railroad some one or two miles in length, the work to be carried out according to the most modern methods of location. Upon the completion of the field work, the complete survey will be plotted and a line adjusted to it. This will be staked out, profiles taken and the computation made of the earthwork and the preparation of overhaul diagram compiled for determination of haul and borrow. In the second term the design of track work, yards and practical problems will be taken up and special problems assigned.

## ADDITIONAL FOURTH YEAR COURSES

280. *Sanitary Engineering*:—Peter Gillespie.  
 Department 1<sub>b</sub>, IV Year; 1 hour lecture per week, both terms; 3 hours laboratory, first term; and 6 hours, second term.  
 Consideration is given to the problems of water supply, sewerage and sewage disposal as viewed by the engineer. Some practice in the design of works from assumed data is afforded. Excursions to places of interest are arranged from time to time.  
 Reference Books:—Public Water Supplies—Turneaure and Russell; American Sewerage Practice—Metcalf and Eddy, 3 vols.
281. *Highway Engineering*:—A. T. Laing.  
 Department 1<sub>b</sub>, IV Year; 1 hour lecture and 3 hours laboratory per week, both terms.  
 This course of instruction deals with the design, construction and maintenance of public highways and street pavements, also with the properties of the materials employed. Accompanying the course of lectures is a laboratory course dealing with the various bituminous and non-bituminous materials of construction. Excursions to places of interest are arranged for during the fall term.
282. *Municipal Seminar*:—P. Gillespie, A. T. Laing.  
 Department 1<sub>b</sub>, IV Year; 3 hours per week, both terms.  
 This time is devoted to reading, essay writing and discussion of problems relating to highways, transportation, town planning, sanitation and kindred subjects.
283. *Zymology*:—H. B. Speakman.  
 A study of the phenomena of fermentation and their industrial applications.

## THESIS

285. *Thesis*.  
 Required in all Departments, IV Year, with the exception of Department 4, Architectural Design Option.  
 Each student is required to prepare a thesis of between six thousand and seven thousand words on a subject approved by Council.  
 See circular of information.

## OUTLINE OF VACATION WORK

286. *Construction Notes*.  
 II Year. Departments 1, 2, 3, 4, 6, 7.  
 The construction notes required consist of neat and complete dimensioned sketches in pencil of any structures, machines or plants which may be of interest. Any object chosen should be represented and dimensioned in such a manner that it could be completely constructed from the notes as the only available information. (See page 29.)

From students in Department 2, who have been actually engaged during the summer with Government or other approved geological survey parties, geological field notes will be accepted in lieu of construction notes.

### SCHOOL OF ENGINEERING RESEARCH

A School of Engineering Research, within the Faculty of Applied Science and Engineering, was established in the Spring of 1917 at the suggestion of the late Dean Ellis.

The School is under the direct supervision of a Committee of Management composed of fifteen Members of the Faculty Council. To this Committee is entrusted the selection of researches to be undertaken under the auspices of the School, and the disposition of funds conducting them.

The School was organized chiefly for the training of graduates in methods of research, and for the carrying out of investigations. These latter may be problems relating to specific industries or raw materials and having a specific end in view, or general problems having to do with fundamental principles.

A number of research assistants are appointed annually in the various departments of the Faculty to carry on the work of research under direction of members of the staff. The facilities of the School are also open to graduates who desire to penetrate more deeply into particular phases of experimental work, or to undertake investigations either suggested by members of the staff or arising from their own work since graduation.

Address communications to the Secretary—Professor Maitland Boswell, Ph.D.

### ADVANCED COURSE IN HYDRO-ELECTRIC POWER

In view of the importance of Hydro-Electric power in Canada, further facilities are offered to those graduates who wish to supplement the present extensive undergraduate courses bearing upon this subject. Graduate studies may be pursued by candidates for the Degree of Master of Applied Science as soon as desired after graduation.

To those returning after satisfactory experience in some approved phase of Hydro-Electric work, somewhat more specialized courses may be given than are possible with very recent graduates. The Engineering Alumni Association of the University has expressed its willingness and desire to assist such candidates in obtaining suitable employment to fit them for these courses of study, but such courses are available only to those with the proper undergraduate preparation.

Graduates who may wish to avail themselves of the arrangements proposed are advised to communicate with the Dean.

It should be noted that candidates for post-graduate degrees register with the Secretary of the School of Graduate Studies. For further particulars see Calendar of the School of Graduate Studies and page 103 of this Calendar."

**MASTER OF APPLIED SCIENCE DEGREE  
MASTER OF ARCHITECTURE DEGREE**

- 1A. A candidate for the degree of M.A.Sc. shall hold the degree of B.A.Sc. of this University or a degree from some other University recognized as equivalent by the Council of the School of Graduate Studies.
- 1B. A candidate for the degree of Master of Architecture should hold the degree of Bachelor of Architecture or the degree of Bachelor of Applied Science in Architecture of this University or a degree from some other University recognized as equivalent by the Council of the School of Graduate Studies.
2. He shall register with the Secretary of the School of Graduate Studies at the beginning of the academic year.
3. Not later than November 1 of his academic year, he shall submit to the Secretary for acceptance by the School of Graduate Studies the title of his proposed thesis as approved by the department concerned.
4. Not later than April 30th of his academic year, he shall present evidence to the Council of the School of Graduate Studies that he has spent not less than one academic year of the department concerned as a student enrolled in one of the following departments on a course of study approved by the department:—Civil Engineering, Mining Engineering, Mechanical Engineering, Architecture, Chemical Engineering, Electrical Engineering, Metallurgical Engineering.
5. Not later than April 30th of his academic year, evidence that the candidate has satisfactorily met all the requirements of the department with regard to thesis and to such examinations as the department shall require, shall be forwarded to the Council of the School of Graduate of Studies through the sub-committee administering the regulations governing the degrees of M.A.Sc. and M.Arch.

## PROFESSIONAL DEGREES

The attention of graduates is directed to the following regulations respecting professional degrees.

The following degrees have been established: Civil Engineer (C.E.), Mining Engineer (M.E.), Mechanical Engineer (M.E.), Electrical Engineer (E.E.), Chemical Engineer (Chem.E.), Metallurgical Engineer (Met.E.), subject to the following regulations:

1. A candidate for one of the said degrees shall hold the diploma of the School of Practical Science or of the Faculty of Applied Science and Engineering or the degree of Bachelor of Applied Science.
2. He shall have spent at least three years after receiving the diploma or the degree in the actual practice of the branch of engineering wherein he is a candidate for a degree.
3. Intervals of non-employment or of employment in other branches of engineering shall not be included in the above three years. It shall not be necessary that the several periods requisite to make up the said three years be consecutive.
4. Satisfactory evidence shall be submitted to the University examiners as to the nature and length of the candidate's professional experience for the purpose of clauses 2 and 3.

The Examiners may satisfy themselves by oral or written examinations in regard to the candidate's experience and competence.

5. The candidate shall prepare an original thesis on some engineering subject in the branch in which he wishes a degree, the said thesis to be accompanied by all necessary descriptions, details, drawings, bills of quantities, specifications and estimates.

The candidates may be required at the option of the Examiners to undergo an examination in the subject of this thesis.

6. Notice in writing shall be sent to the Secretary not later than the first day of November, informing him of the degree to which the candidate wishes to proceed and of the title of his proposed thesis for the approval of the Examiners.
7. The evidence under clause 4, and the thesis, with accompanying papers, described in clause 5, shall be sent to the Secretary not later than the first day of April.
8. The candidate shall be required to present himself for examination in the month of April at such time as may be arranged by the Examiners.
9. The fee for any one of the said degrees shall be twenty dollars, and shall be paid to the Bursar not later than the first day of April.

10. The thesis, drawings, and other papers submitted under clause 7 shall become the property of the University.
11. Nothing in this statute shall prevent any candidate from receiving more than one of the said degrees, provided he has the necessary qualifications for each degree. An interval of three years must elapse between the granting of any two degrees under this statute.
12. All communications must be addressed to the Secretary of the School of Graduate Studies.

#### CERTIFICATE FOR HIGH SCHOOL ASSISTANT

The Calendar of the Ontario College of Education provides for the admission of the holder of a degree in Science to the Course for a High School Assistant's certificate. The regulation requires that the applicant shall submit with his application:

"His certificate of graduation as Bachelor or Master of Arts, Bachelor or Master of Science, Bachelor of Commerce, Bachelor of Agriculture, or Bachelor of Applied Science, from a British University, after the regular university course approved by the Minister of Education as to entrance requirements and as to content of the undergraduate courses. Each applicant must have Upper School or Honour Matriculation standing in English and History and Mathematics or the equivalent of such standing."

## LABORATORY EQUIPMENT

---

### THERMODYNAMIC AND MECHANICAL LABORATORY

The University in 1919 completed the erection of a large, well-equipped building for the accommodation of the steam, gas, mechanical and hydraulic laboratories. A more complete description of the laboratories has been published elsewhere, so that the present description is only intended to give the main features.

The part of the building set apart for thermodynamics and other mechanical work is the ground floor of a room 60 ft. x 155 ft. This room is lighted entirely from the roof in a very perfect way. A part of the space 40 ft. wide running the entire length of 155 feet is served by a 3 ton travelling crane and contains the following equipment:

50 h.p. Brown engine with separate jackets on both heads and barrel of cylinder.

Two-stage Rand air compressor having compound steam cylinders, each fitted with Meyer cut-off gear. The low pressure air cylinder has Corliss inlet gear.

30 h.p. high-speed Leonard tandem compound engine with shaft governor.

15 h.p. high-speed McEwan engine.

75 h.p. two-line compound Willans engine.

25 h.p. General Electric steam turbine.

Two 15 h.p. Leonard engines with different types of valves, which are used for valve setting.

There are also two surface condensers with air pumps so arranged that any engine in the laboratory may be made to exhaust into the atmosphere through an open heater or into one of the condensers, the change from one arrangement to the other being accomplished in a few minutes without the aid of valves.

The laboratory further contains:

A 3 ton York refrigerating machine with tanks.

An Amsler transmission dynamometer.

Apparatus for testing injectors and steam pumps.

Numerous other pieces of apparatus and instruments.

The work on internal combustion engines and producers is performed on the following:

18 h.p. Canada suction gas producer.

14 h.p. National gas engine arranged for various compressions and points of ignition.

10 h.p. Fielding and Platt engine for city gas or coal oil, having various adjustments

8 h.p. Otto gas engine.

25 h.p. Allen semi-Diesel engine.

25 h.p. tractor gasoline engine.

200 h.p. Sprague electric dynamometer.

Various accessories to above machines.

Steam for the laboratory is supplied by two 50 h.p. and one 100 h.p. Babcock and Wilcox boilers, the latter having an internal superheater. These boilers are located in a separate boiler room. They are used for experimental work only and are fitted up for testing. The gases pass up through two independent chimneys, and these have been arranged so that the draft and other conditions in the chimney at any point of its height may be examined.

In smaller work-rooms off the main laboratory are placed belt and oil testing machines, apparatus for testing the efficiency of gears and machines, and for experiments in the balancing of machinery.

### HYDRAULIC LABORATORY

The hydraulic laboratory occupies two floors each 40 feet x 112 feet, which are well lighted by large windows on the side and end.

The water for the experimental work is pumped through the various pieces of apparatus from a well by means of two turbine pumping units, both of which are driven by a Belliss and Morcom compound engine of 125 h.p. running at a speed of 525 revs. per minute. Both engine and pumps have been installed with a view to using them in experimental work as well as for supply of water for other apparatus used in the laboratory.

The pumping units are capable of delivering one cubic foot of water per second against heads of 250 feet and 300 feet respectively. These units are designed and connected up so that they may be run in series giving the above discharge at 550 feet head, or they may be run in parallel giving double the discharge at a lower head. Each pumping unit consists of two two-stage pumps mounted on a common base and driven by a single pulley, and the construction and piping are such that each two-stage pump may be driven separately or that all may be driven at once, discharging separately one cubic foot per second at about 125 feet head through each of four independent pipes, or else the pumps may be run in series or in parallel. The scheme is thus well adapted to laboratory work, and under the heads used on reaction turbines about six cubic feet per second may be obtained.

In addition to this there is an electrically driven pump capable of delivering six cubic feet per second at a head of sixty-five feet and which is most helpful in turbine testing. Attention is called to the special turbine testing flume described below.

The laboratory further contains a large vertical steel tank  $5\frac{1}{2}$  feet diameter by 34 feet with arrangements for the attachment of nozzles

and other mouthpieces, etc. Connections are also arranged for reaction turbines, the tank acting as a reservoir.

The discharge from the turbines or nozzles is measured in a weir tank nearly 6 feet wide and 21 feet long, containing a contracted weir  $4\frac{1}{2}$  feet wide. This weir may be calibrated by two weighing tanks, each having a capacity of about 240 cubic feet.

There are three reaction turbines and two impulse wheels all ready for experiment, the power being measured by brakes and the water by weir or orifices. Amongst the reaction turbines may be mentioned the one designed and built by Escher Wyss & Co., specially for the laboratory.

A new and specially designed turbine testing flume has recently been added to the laboratory, the machinery for which has been largely furnished through the kindness of the Dominion Engineering Works, Montreal, and Wm. Cramp and Sons, Philadelphia. This flume is supplied with water by a Moody spiral pump of twelve cubic feet per second capacity and at present there are two turbines, one of the propeller type, and also two special draft tubes and more will be added. This provides an excellent opportunity for experiment and research.

Smaller orifice and weir tanks, each about  $3 \times 3 \times 12$  feet with necessary measuring tanks, are arranged for instruction in coefficients of various kinds and practice with weirs and orifices.

A Venturi meter and other meters, also an hydraulic ram and similar devices are available for testing, and good facilities have been arranged for investigating friction and other properties of pipes and fire hose.

For special investigations on turbine and centrifugal pumps, other pumps in addition to those already described have been arranged.

The basement of the laboratory contains an open trough 5 feet wide, about 110 feet long, with a large weir at one end. It is intended to use this trough for experiments on the flow in open channels, for measurements of large discharges by means of the weir, and for experiments with current meters and Pitot tubes.

Numerous pieces of smaller apparatus, together with all instruments required, have also been provided, and the laboratory equipment is believed to be very complete.

#### AERODYNAMIC LABORATORY

The Aerodynamic Laboratory is located in a separate special building. The Laboratory is fully equipped with an improved 4-ft. Royal Aircraft Establishment type wind channel, aerodynamic balance, micromanometers and other necessary instruments.

Air speeds of 80 feet per second can be secured in a stream of great steadiness and uniformity and higher speeds with some sacrifice in steadiness.

The work done in the Laboratory includes the investigation of problems in aerodynamics, tests of air craft components, and complete machines, rating of meters, ventilators, radiators, etc., and the study of the effect of wind pressure on structures, chimneys, etc.

### DONATIONS TO THE THERMODYNAMIC AND HYDRAULIC LABORATORIES

The following donations to the equipment of the laboratories have been made through the kindness of those mentioned:

50 h.p. Wheeler Surface Condenser, presented by Mr. F. M. Wheeler, New York.

Blake Feed Pump, presented by the manufacturers.

6-inch New American Turbine, presented by Wm. Kennedy & Sons, Owen Sound, Ont.

Two Crown Water Meters, presented by the National Meter Co., New York, through Mr. M. Warnock, Toronto.

Rock Drill, presented by Sullivan Machinery Co., New York, through Mr. A. E. Blackwood, '95.

Marine Gasoline Engine, presented by Canadian Fairbanks Co., Montreal.

Two engines with different types of valve, presented by Messrs. E. Leonard & Sons, London, Ont.

Bundy trap from American Radiator Co., through Messrs. Russell & Gifford.

Dunham steam trap from C. A. Dunham Co.

Sectional models of valves from American Radiator Co.

Sectional model Mason Reducing Valve by Russell & Gifford.

Tanks, etc., by John Inglis Co.

Pressure Fan from Sheldons Ltd., Galt.

Model water turbine test runner from Wellman, Seaver Morgan Co., Cleveland, O.

Equipment for new turbine testing flume from Dominion Engineering Works, Montreal.

Multi-stage pump from Goldie and McCulloch, Galt.

Hytor vacuum pump complete with motor, etc., from Nash Engineering Co., Norwalk, Conn., through A. S. Leitch and Co., Toronto.

Model water turbine runners from Allis-Chalmers Co., Milwaukee.

Section of Trident water meter from Neptune Meter Co., Toronto.

In addition to the above, other firms have materially assisted by offering apparatus at or below cost price, among whom may be specially mentioned, The Canadian Rand Drill Co., Sherbrooke, Quebec.

The following machines are gifts from the Royal Air Force:

One S.E.5 Scout.

One Avro Training Biplane.

Liberty Aeroplane Motor 400 h.p.

200 B. h.p. Siddeley Deasey Aero Engine.

120 h.p. Beardmore Aero Engine.

Curtis Engine (Sectional).  
 Hispano Suiza Aero Engine.  
 80 h.p. Le Rhone Rotary Engine.  
 Clerget Rotary Engine.  
 Gnome Monosoupape Engine.  
 Admiralty Rotary Engine 150 h.p.  
 Models of Engines, etc., and numerous spare parts.

### ENGINEERING PHYSICS LABORATORIES

#### *Illuminating Engineering.*

The laboratories for this work are equipped with 3 metre optical benches for instruction in the fundamental theory of optical instruments. There is also a general equipment consisting of one or more of the following: telescopes, field glasses, microscopes, spectrometers, sextants, range finders, polarizing instruments, etc. For work in illumination there is provided: a 3 metre precision photometer with integrating mirrors and rotator, integrating spheres, radial distribution photometer, portable illuminometers, spectro-photometer, gas light photometer, life racks, etc.

#### *Hydrostatic Laboratory.*

The Hydrostatic Laboratory is supplied with various types of hydrometers, hydrostatic balances, pumps, gauges, etc.

#### *Heat Laboratory.*

The Heat Laboratory is equipped with a full supply of colorimeters and accessories for determination of latent and specific heat, expansion apparatus, air thermometer, apparatus for verification of Boyle's law and pressure and boiling curve, and for determination of the absolute expansion of mercury, Callendar's apparatus for determination of the mechanical equivalent of heat. Calorimeter for the determination of the value of solid, liquid and gaseous fuels.

#### *Acoustical Laboratory.*

The Acoustical Laboratory is provided with sonometer, siren, forks ordinary and electric, Lissajous' and Melde's apparatus, organ pipes of various forms, manometric flame apparatus and a special equipment for work in architectural acoustics consisting of torsion chronograph, electro-pneumatic wind chest and standardized organ pipes and other accessories.

The following donations have been received for work in Illuminating Engineering, and are gratefully acknowledged:

Sample board of electric fittings from the Harvey-Hubbell Co., Toronto;  
 Sample board and easel, showing types of condulets, from the Crouse-

Hinds Co., Toronto;

Demonstration sets to show construction of incandescent electric light bulbs, from the Canadian Sunbeam Lamp Co., Toronto;

Lamp rack illustrating various types of incandescent electric bulbs,  
from the Canadian Westinghouse Co., Hamilton;

Sample board illustrating types of industrial reflectors and elexit and  
other fittings, Benjamin Electric Co., Toronto.

Gasoline Mantle Lamps, Coleman Lamp Co., Toronto.

### PHOTOGRAPHIC AND PROJECTION LABORATORIES

The Photographic Laboratory contains a supply of small cameras for the use of students, enlarging cameras, printers, blue printing machine and the necessary dark rooms.

This Department also carries on a photographic and projection service for all Faculties and Departments of the University. The equipment for this work consists of cameras for making photographs up to full plate size, enlargers, photo-micrographic apparatus, motion picture cameras for both gross and micro work, with the necessary developing and printing machines, a rotary blue print machine, a photostat, etc.

For projection service there is a motion picture projector and a number of projection lanterns for service in any University Building.

### ELECTRICAL LABORATORIES

The Department of Electrical Engineering is located in the Electrical Building. The accommodation includes quarters for staff, library, lecture rooms, laboratories, stores, and shop for repairs and construction.

Services.—Three-wire direct-current, 110 kw., from the University power house, automatically regulated at our end for constant voltage of desired value at our main switchboard. Three-phase, 60 cycles, 60 k.v.a., 115 volts, automatically regulated as to voltage and frequency. Three-phase, 25 cycles, 30 k.v.a., automatically regulated as to voltage and frequency. Every laboratory has all three services available at convenient places. There are three main boards, one for each floor. A system of special trunk lines between boards, and tree systems on each floor, enable easy arrangement of any desired special connections from any laboratory to any other.

Alternating current laboratory.—Area 26 x 110 ft., service sets 60 and 25 cycles, Tirrill regulators. Two 60-cycle and two 25-cycle, 15 k.v.a. motor-generator sets; converters; various motors, squirrel cage and wound rotor induction types, repulsion and other single-phase types, unity power factor motor, polyphase motor with variable speed shunt characteristics and speed range of 4 to 1; transformers, single and three-phase; constant-current transformers with load of series arc lamps; lamp racks, reactors, condensers, brakes, etc.; oscillographs; indicating, graphic, recording, and demand meters of the best makes; all arranged to facilitate a very general line of experimental work.

Direct current laboratory.—40 kw. 230 to 115 volt motor generator set with Tirrill regulator for special tests. Numerous 5 kw. to 10 kw. motor-generator sets; shunt, series, compound motors; special interpole machines; loading racks, dynamometers, rheostats, numerous meters of first quality, etc., for any sort of study.

Measurements Laboratory.—26 x 110 ft. Fitted with very flexible storage battery service which can be connected to any desired working place; d.c. three-wire service, also 60 and 25-cycle three-phase everywhere; galvanometers, resistance boxes, bridges, shunts, potentiometers, standard cells, bond testers, ductor, megger, apparatus for measuring low resistances, artificial lines for fault measurements, condensers, inductances, rails, cables, voltmeters, ammeters, wattmeters, dynamometers, etc., for general work on a great variety of measurements.

High voltage laboratory.—For various lines of study with voltages up to 200,000 volts. Flexible and safe provision for control.

Materials laboratories.—One specially fitted for general work on conducting materials, one for magnetic materials, one for dielectric materials.

Radio laboratory.—Adapted for the measurement of various quantities of interest in this work, including the strength of incoming signals. One single conductor aerial 1,000 ft. long, one multi-conductor aerial 120 ft. long.

Standardizing laboratories.—One students' calibration room for direct-current meters, another for alternating-current meters. A standards room, constant temperature, for master standards of voltage, resistance, current, power, etc.

Research laboratories.—Four rooms set apart for this work, in combination with facilities of the other laboratories.

Design laboratory—Arranged for calculation work on apparatus selected to illustrate essential principles.

### CHEMICAL LABORATORIES

The Chemical laboratories are situated in the western half of the Chemistry and Mining building, on the first and second floors. The rooms are large and well lighted, and are supplied with the usual modern equipment.

The first and second year laboratory for qualitative work has accommodation for 112 students, each working space being supplied with water, gas and fume cupboard. The laboratory for quantitative analysis will accommodate 48 students, and is supplied with commodious fume cupboards and all necessary apparatus. A laboratory with working places for 36 is provided for the students engaged in the study of technical chemistry; it is equipped with appliances for the preparation and testing of chemical products. Laboratories for fourth year students with accommodation for twenty workers has been fitted up. Each of these laboratories has its own balance room adjoining furnished with instruments from the best makers and adapted to the particular objects in view.

In addition there are rooms set apart for research, for gas analysis, and a specially constructed fireproof laboratory for combustion, crucible and bomb furnaces. Each of these laboratories is supplied with apparatus of the most approved design, providing excellent facilities for the prosecution of work in analytical and technical chemistry.

A start has been made in equipping in a room in the basement, set apart for the purpose, as a laboratory for carrying on chemical operations on a small factory scale.

### ELECTROCHEMICAL LABORATORIES

The Electrochemical laboratories, which are situated in the Chemistry and Mining building, are provided with special facilities for electrolytic work, including a large storage battery and electroplating dynamo with tanks as well as a good set of apparatus and electrical measuring instruments. The experimental work on electric furnaces is carried out in a large furnace room in the basement, occupied jointly by this Department and the Department of Metallurgy. The equipment for this purpose comprises a 120 KW, 110 volt generator supplying direct current through a switchboard, rheostats, circuit-breaker and instruments to a set of distributing bus-bars, and a 200 KV-a transformer stepping down from 2200 volts to 30-120 volts in 3 and 6 volt steps, which supplies alternating current at 25 cycles. There is a complete set of A.C. instruments, circuit-breakers, oil-switches, relays, automatic regulating winches, etc., and a Northrup high frequency furnace with its transformer is also installed.

### ASSAYING LABORATORIES

These are situated in the west end of the basement in the Mining Building. They consist of five rooms, in addition to a library for study and an instructor's room. The East laboratory, 17 x 47 feet, and the West laboratory, 28 x 37 feet, are equipped with coal, oil, gas, and electric furnaces of various design. Each room has a fume cupboard, and the necessary equipment for the wet work in connection with assaying. Accommodation for twenty-four students at a time is provided, by individual work desks, each supplied with a balance, weights, fluxes, tools, drawers and lockers. Common to both laboratories is the balance room which has a cement table on brick piers to support the bead balances. These are illustrative of the types met in practice. Adjoining the West laboratory is a research room. A store-room adjoins the East laboratory where fluxes, clay ware and extra parts are kept. In the instructor's room are stored a large number of ores and bullion, obtained chiefly from typical mining districts and metallurgical plants, for class use. The preparation of ores is done in the Milling building, where crushers, pulverizers and sampling devices are available. A special laboratory sampler has been constructed for the purpose of giving samples for the student's assays, of indisputable

similarity, thus confining variations in results to the students' work. Other apparatus includes Guess-Haultain stationary electrolytic outfit, King rotating electrolytic apparatus, microscopes, optical resistance and thermocouple pyrometers, hand and foot cupel machines, grinding plates and screens.

### MINING AND ORE DRESSING LABORATORY

A detached building 72 ft. x 70 ft. contains the Mining and Ore dressing equipment. It is heated, lighted and supplied with power from the central plant. It is divided into several parts, the larger being 72 ft x 53 ft. by 22 ft. high.

In this room is a 5-stamp battery with amalgamation plates, Wilfley table, Deister Plat-o table, Deister slime table, buddle, and classifiers of sufficient size to make tests on lots of from one to ten tons.

In addition are a set of small Wilfley tables, two 3-compartment jigs, a 2 ft. x 3 ft. tube mill, a small experimental tube mill, agitators, small classifiers and other testing apparatus for experimenting on the falling rates of ore particles, slime settling, surface tension and flotation processes. These include a Case machine, a K. and K. machine, a Ruth machine, a Callow cell, etc. Water is supplied from a tank in the roof. The machinery is all motor driven.

One portion of the room is devoted to rock drills of various types and other mining apparatus.

The other part of the building, 72 ft. x 17 ft., is divided into several rooms and contains a Hadfield's Gyratory Crusher, 16 in. x 12 in. Rolls, small crushers, screening machine, and sampling apparatus. The crushers are driven by a 30 h.p. motor in another room.

The other rooms contain a Wetherill magnetic separator, screen sets, a smithing equipment, workshop and storage for small lots of ore. The larger part of the ore supply is accommodated in bins outside the building.

The plant throughout is intended mainly for teaching and experimental purposes.

There has recently been added apparatus especially designed for research work in various phases of rock crushing and grinding:—Ball Mills with plate glass ends for the study of ball paths; a small Ball and Rod Mill on ball bearings with dynamometer; a set of high grade miniature Rolls in ball bearings with integrating dynamometer.

### METALLURGICAL LABORATORIES

This laboratory, in the East end of the Mining building, occupies about 3,600 sq. ft. on the basement floor and the same space immediately above on the ground floor. The basement floor is divided into one large furnace room, a small hydrometallurgical room and two store-rooms. The furnace

room contains a motor driven Connersville blower, several gas fired furnaces, two small blast furnaces, and a small 6 hearth Wedge roasting furnace. The larger electric furnaces of the Department of Electrochemistry are in this room. Some are supplied with direct current, others with A.C. from a 200 K.V.A. transformer. A system of flues, with hoods over all the furnaces, leads through a Cottrell precipitator of the Rathbun type taking current at 50,000 volts, to a stack through which gases are pulled by a fan in the attic.

The hydro-metallurgical room in addition to apparatus for leaching tests contains several natural draft furnaces, a large Hoskins resistance furnace and a 113 lb. drop hammer. There are also tanks for electrolytic refining and precipitation of metals.

The upper floor is divided into laboratories, store rooms and offices. The laboratories are: 1. Metallurgical analysis; 2. Heating treatment and pyrometry; 3. Grinding, polishing and etching; 4. Metallographic room with an adjoining dark room.

In the laboratory for metallurgical analysis the student is given some training in mill and smelter methods of analysis. It is well equipped for this work.

In the heat treatment and pyrometry laboratory are a number of tube furnaces of different sizes, a Leeds & Northrup transformation point indicator with furnace, double thermocouple and twin galvanometer, a Leeds & Northrup potentiometer pyrometer, a disappearing filament pyrometer, and many thermocouples for use with galvanometer or potentiometer. For grinding and polishing there is provided two motor driven emery wheels and a set of 3 motor driven horizontal polishing plates.

The metallographic room is equipped with one horizontal photo micrographic instrument made by Pellin Paris, one vertical photo micrographic apparatus by Bausch & Lomb and two other Bausch & Lomb metallographic microscopes.

There are also a Pellin instrument for the determination of critical points by photography according to the Saladin method and a Leeds & Northrup type "K" precision potentiometer, which is also used for the determination of critical points.

### MECHANICS OF MATERIALS LABORATORY

This laboratory is available for the scientific and commercial testing of materials of construction such as iron, steel, timber, concrete and masonry.

It is supplied with the following:

An Emery 50-ton hydraulic machine, built by Wm. Sellers & Co., of Philadelphia, for making tests in tension and compression.

A 100-ton screw power machine, built by Riehle Bros., Philadelphia. It is designed for making tests in tension, compression, shearing and cross-breaking, and will take in posts 12 feet long and beams up to 18 feet in length.

A Riehle 10-ton screw power universal testing machine.

A Riehle 50-ton screw power universal testing machine.

A Riehle 50-ton hydraulic testing machine intended especially for testing concrete blocks.

A Riehle standard brick rattler.

A 15-ton single lever-machine, built by J. Buckton & Co., Leeds, England.

A torsion machine, built by Tinius Olsen & Co., Philadelphia, for testing the strength and elasticity of shafting. This machine will twist shafts up to 16 feet in length and 2 inches in diameter.

A hand power torsion machine of simple mechanical construction, specially designed for the testing of short shafts of a maximum diameter of one inch.

A Riehle transverse testing machine of 5,000 pounds capacity, adapted to specimens up to 48 inches in length.

A Riehle compressometer, with spherical seat attachment for the adjustment of specimens having slightly non-parallel faces. This compressometer will receive specimens up to 10 inches in length.

An Olsen compression micrometer of standard type.

A 20,000 pound Olsen, hand power, wire testing machine, specially fitted for testing wooden columns with both fixed and pivoted ends.

An Olsen combined tension and cantilever type impact testing machine.

An Olsen, 20,000 pound, hand power testing machine especially adapted for testing long columns.

An Olsen, 200 pound capacity, textile testing machine.

A Riehle abrasion cylinder, built to the standard required by the National Brickmaker's Association, adopted in 1901.

A Berry strain-gauge for spans of 3 inches and 8 inches.

A Nalder dividing engine. This may be used either for the precise division of scales or for the calibration of instruments intended for refined measurements.

A Brinell hardness testing machine.

A Shore scleroscope for testing hardness.

A large number of extensometers of the usual degree of precision. These include the Bauschinger, Martens, Unwin, Ames, Riehle, Johnson, Henning (recording) and other types. In addition there are the usual scales, micrometers, telescopes and reflectors, voltmeters for the determination of metallic contact, and such other appliances as are necessary in the making of precise measurements.

The shop is equipped with a number of high-class machine tools specially fitted for reducing the specimens to the requisite shapes and dimensions with a minimum of hand labour. It is also supplied with the necessary appliances for making ordinary repairs and for making apparatus for special experiment and original investigation.

## HIGHWAY LABORATORY

### ROAD METALS

This laboratory is equipped for carrying out investigations in the various materials employed in highway construction and maintenance, and comprises the following:

- Page impact machine for testing the toughness of road materials.
- Diamond core drill for preparing specimens for the toughness test.
- Deval abrasion machine for testing the resistance to wear of road materials.

Cementation testing apparatus (Page type) for determining cementing properties of road materials.

- Jaw crusher (Mitchell type) for crushing rock for various tests.
- Power driven agitator with sieves for the mechanical analysis of sand, gravel and crushed rock.

Dorry hardness testing machine for determining the hardness of rock used in road construction.

### BITUMENS

This laboratory is designed for the investigation of the physical rather than the chemical properties of bitumens used in road construction and maintenance. The equipment consists of an extractor for separating bitumens and aggregates, an Engler viscosimeter, a penetration apparatus as well as appliances for determining melting point, volatilization, specific gravity, ductility, etc.

## LABORATORY OF ONTARIO BOARD OF HEALTH

Through the courtesy of the Secretary of the Provincial Board of Health for Ontario the facilities of the excellently equipped laboratory which the Board maintains at Stanley Park have, with certain conditions, been placed at the service of the University for the investigation of problems of interest to the sanitarian and the sanitary engineer. The equipment consists of various types of sewage sedimentation tank, sewage filter, sewage measuring devices, aerators, sterilizing appliances and a complete and representative plant intended for the filtration and sterilization of water by practically all known methods.

## CEMENT TESTING LABORATORY

This laboratory is fitted with all the ordinary moulds, sieves, balances burettes, steaming and drying tanks, tables, and other appliances necessary in making the usual physical tests of a Portland cement. It is also supplied with completely equipped cabinets for individual work. In addition there are the following:

- A 2,000 lb. Riehle shot machine for tension.
- A 2,000 lb. Fairbanks shot machine for tension.

A 1,000 lb. Olsen automatic shot machine fitted for tests in either tension or cross breaking.

An Olsen soapstone moist closet of modern design.

### METROLOGICAL LABORATORY

The department of surveying and geodesy is provided with all the ordinary field instruments, such as transits, levels, compasses, micrometers, sextants, planimeters, plane tables, tapes, chains, etc., with which is carried on the instruction in practical field operations as detailed elsewhere.

A small laboratory is also established in the basement of the observatory described below, containing the necessary instruments for the refined measurements of geodetic surveying; as, a standard yard and metre, a Rogers 10-foot comparator, an invar base measuring apparatus, a Kater's pendulum with vacuum chamber, a level trier, micrometer microscopes, etc.

The geodetic observatory in connection with this department is used for the instruction of students of the Fourth Year in taking observations for time, latitude, longitude, and azimuth by the precise methods used in connection with a geodetic survey. It contains a 10-inch theodolite and zenith telescope by Troughton & Simms; an astronomical transit instrument and an 8-inch theodolite by Cooke; two electro-chronographs; a Howard astronomical clock; a Dent sidereal clock; a Dent sidereal break-circuit chronometer; a wireless receiving instrument; arithmometers, etc.

### GEOLOGICAL AND MINERALOGICAL LABORATORIES

In the Chemistry and Mining building on College Street the University possesses a modern laboratory for Geology and Mineralogy.

Courses are given in laboratory work, especially in personal examination of type sets of rocks, fossils, minerals and crystal models. These laboratory exercises serve to illustrate the introductory didactic instruction.

For the encouragement of pure crystallography the laboratories are supplied with goniometers of the various types, crystal models, appliances for the cutting of oriented crystal sections and for the physical examination of the same. Practical petrography is carried on in rooms provided with type sets of rocks, both macroscopic and microscopic. Advanced students are taught to make thin sections of rocks and fossils and to study them microscopically. For students in Mining a laboratory course in the interpretation of geological maps and section is provided. Typical mining regions are studied in detail and an opportunity is afforded for the examination of specimens illustrating economic geology.

The laboratory for the preparation of thin sections of rocks, minerals and fossils is provided with electric diamond saws and grinding appliances for the various types of work incidental to the preparation of thin sections and museum material.

A room is also provided for advanced work in cartography and geological surveying.

The departments possess 28 petrological microscopes and 5 of other types, so that it is now possible to provide advanced students with instruments and sets of thin sections for their own especial use. The blowpipe laboratory contains 156 lockers, especially designed for apparatus for students. Provision is made for the study of opaque minerals in reflected light.

### LIBRARY

The University Library is contained in a building of its own, situated on the east side of the campus, that lies to the south of the Main Building. All students who have paid a library fee to the Bursar of the University are entitled to the privileges of the Library. Besides Reading Rooms the Building contains Departmental Studies, which may be used as study-rooms by honour students in the various branches and in which the Professors hold seminary courses, and private studies, intended for members of the Faculty or advanced students engaged in research work. The Library is opened at 8.45 every morning and remains open until 5.15 in the afternoon (6 p.m. during the second term). Books in ordinary use may not be taken out of the building during the daytime, but are lent for the night shortly before the hour of closing, to be returned the following morning before 10 o'clock. Books not in general demand may, on special application, be borrowed for a longer period. Failure to return a borrowed book at the proper time and other breaches of the regulations are punishable by fine or suspension from the privileges of the Library.

Rooms have been set apart in the Engineering, Mechanical, Chemistry and Mining and Electrical buildings for the housing of such periodicals and other literature of the University Library as is of special interest to the students of this faculty.

### ROYAL ONTARIO MUSEUM

#### ARCHAEOLOGY, GEOLOGY, MINERALOGY, PALAEONTOLOGY, ZOOLOGY

Students of the University in all departments are recommended to avail themselves of the privileges of the Museum, which, although under separate control, is intimately connected with the work of the University.

The Museum is open on all week days from 10 a.m. to 5 p.m., and on Sundays from 2 p.m. to 5 p.m. The admission is free to the public on Tuesday, Thursday, Saturday and Sunday. On other days an admission fee of fifteen cents is charged.

By a resolution of the Board of Trustees all regular students of the University may be admitted free on all days of the week by presenting their card of registration.

## UNIVERSITY OF TORONTO C.O.T.C.

The Toronto Contingent of the Canadian Officers Training Corps was organized in 1914, with a strength of 12 Companies. Its primary object is to provide students at Universities with a standardized measure of military training with a view to their qualifying for commissions in the country's auxiliary forces. C.O.T.C. Certificates of qualification exempt their holders from examination for commissioned rank on joining a militia unit. The facilities which are offered by the contingent for obtaining a qualification while at the University, are intended to enable gentlemen to give personal service to their country with the least possible interference with their civil careers, to ensure that units have their establishments complete in the junior commissioned ranks, and to build up an adequate reserve of scientifically trained officers who have completed a period of consecutive and systematic military training, on academic lines, of a nature calculated to produce good officers.

The contingent provides the practical work for students taking the Military Studies option for the B.A. degree, as also physical exercise for students who may choose this as the form in which they will take their compulsory Physical Training. In addition to service in the corps for a University credit, students of any year or Faculty are trained in it to qualify for officers' certificates, writing on the examinations set by the War Office for members of O.T.C. contingents throughout the Empire. As the corps develops, after the set-back subsequent to its continuous activities during the war, it is hoped that it may be possible to form companies according to faculties and to so arrange the training of each that on leaving the University students will be qualified for commissions in that branch of the Militia to which their University course particularly applied.

During session 1921-22 three companies were successfully reorganized—in Arts, Medicine and Applied Science respectively—and it is hoped so to arrange the training of each that on leaving the University students will be qualified for commissions in that branch of the Militia to which their University course particularly applied.

The C.O.T.C. is a unit of the non-permanent Active Militia but forms no part of the organization for war and cannot be called out for active service as such. It is a training centre for the educated youth of the country from whom, as from all its sons, the Empire requires hard service but the hardest from those to whom most has been given.

The present Headquarters are at 184 College Street, and include armouries, members' reading room, library, and lecture room.

The Contingent's Staff is:

<i>Officer Commanding</i> .....	Colonel W. R. Lang, late Gen. Staff, C.E.F.
<i>Second in Command</i> .....	Major T. R. Loudon, late Can. Eng., B.E.F.
<i>Adjutant</i> .....	Major H. H. Madill, late I.C., C.E.F.

*Quartermaster*.....Lieut. V. C. Kerrison, late C.A.S.C., C.E.F.  
*Paymaster*.....Lieut. T. A. Reed  
*Musketry Officer*.....Lt.-Col. R. E. Smythe  
*Contingent Sergeant-Major*....S.-M. W. Hunt, late Royal Welch Fusiliers.

Officers of "C" (Applied Science) Company:

*Officer Commanding*.....Major J. R. Cockburn, M.C.  
*Second in Command*.....Capt. W. J. T. Wright, M.B.E.  
*Subalterns*.....Lieuts. F. J. Milne, C. R. Davis, H. Miller,  
W. C. Cooper, H. G. G. Whitton, A. D.  
Morton.

## SOCIETIES

---

### THE ENGINEERING SOCIETY OF THE UNIVERSITY OF TORONTO

---

#### OFFICERS FOR 1923-1924

<i>President</i> .....	W. A. Osbourne
<i>First Vice-President</i> .....	W. E. Carswell
<i>Second Vice-President</i> .....	G. W. Smart
<i>Treasurer</i> .....	J. F. Millican
<i>Secretary</i> .....	C. K. Lally
<i>Curator</i> .....	E. R. Complin
<i>Fourth Year President</i> .....	W. A. Becker
<i>Third Year President</i> .....	H. C. Smith
<i>Second Year President</i> .....	D. W. Dow
<i>First Year President</i> .....	T. B. Smith
<i>Civil Club Representative</i> .....	W. H. Campbell
<i>Mining and Metallurgical Club Representative</i> .....	K. C. Gray
<i>Mechanical and Electrical Representative</i> .....	H. J. Pugsley
<i>Chemical Club Representative</i> .....	H. N. Baker
<i>Architectural Club Representative</i> .....	E. M. Coleman
<i>Debating Club Representative</i> .....	G. H. Rowat
<i>Athletic Association Representative</i> .....	R. M. Laurie

The Society meets every second Wednesday during the academic year (except April), beginning with the second Wednesday in October. Addresses are given by prominent men on subjects of general interest.

The Society is divided into six clubs for the purpose of affording a medium of study of matters relating in particular to different branches of Engineering. Each of the Clubs holds its meetings at regular intervals. Papers are read and discussions held on engineering subjects.

The Society publishes an annual, called "Transactions," which contains the addresses given at the meetings and an account of the year's activities.

A Supply Department is conducted by the Society on a co-operative plan, through which instruments, draughting supplies, stationery, etc., can be purchased at a low cost.

#### ATHLETIC ASSOCIATION

1923-1924

<i>Hon. President</i> .....	Prof. T. R. Loudon
<i>President</i> .....	R. M. Laurie
<i>Vice-President</i> .....	C. Morrison
<i>Secretary-Treasurer</i> .....	F. Milne
<i>Fourth Year Representative</i> .....	B. Matson
<i>Third Year Representative</i> .....	S. Perry
<i>Second Year Representative</i> .....	W. Thompson
<i>First Year Representative</i> .....	S. S. Sommerville

The Athletic Association has full control over all athletic clubs using the name of the Faculty of Applied Science. The Executive Committee has power to suspend any one from the privileges of membership in the Association for any breach of its regulations, and controls the finances of all athletic clubs in the aforesaid Faculty. The annual membership fee of this Association is one dollar.

No other moneys are collected for the support of athletics in the Faculty of Applied Science without the sanction of the Executive Committee.

### DEBATING CLUB

1923-1924

<i>Hon. Chairman</i> .....	Prof. E. A. Allcut
<i>Chairman</i> .....	G. H. Rowat
<i>Vice-Chairman</i> .....	S. L. Grenzebach
<i>Secretary-Treasurer</i> .....	J. H. Ings
<i>Fourth Year Representative</i> .....	P. H. Take
<i>Third Year Representative</i> .....	A. D. Turnbull
<i>Second Year Representative</i> .....	E. T. W. Bailey
<i>First Year Representative</i> .....	H. Vernon

The Debating Club exists for the purpose of helping students to overcome their natural embarrassment when speaking in public and to that end holds weekly meetings during both terms, at which open debates take place after the manner of the Oxford Union.

### THE INDUSTRIAL CHEMICAL CLUB

1923-1924

<i>Hon. President</i> .....	Prof. J. W. Bain
<i>Hon. Vice-President</i> .....	Prof. E. G. R. Ardagh
<i>Chairman</i> .....	H. N. Baker
<i>Vice-Chairman</i> .....	R. B. Kerr
<i>Secretary-Treasurer</i> .....	J. M. Jeffries
<i>Curator</i> .....	M. R. Feely
<i>Fourth Year Representative</i> .....	J. Dow
<i>Third Year Representative</i> .....	C. O. Morton
<i>Second Year Representative</i> .....	W. D. Adams
<i>First Year Representative</i> .....	G. R. Connor

The object of the Chemical Club is to promote the study of industrial chemistry and chemical engineering. Illustrated lectures, preceded by an informal dinner and a short musical programme, are held fortnightly, and on the following day an excursion is made to industrial concerns located in the city or vicinity.

MECHANICAL AND ELECTRICAL ENGINEERING CLUB  
1923-1924

<i>Hon. Chairman</i> .....	Prof. R. W. Angus
<i>Hon. Vice-Chairman</i> .....	Prof. H. W. Price
<i>Chairman</i> .....	H. J. Pugsley
<i>Vice-Chairman (Mechanical)</i> .....	C. E. Catto
<i>Vice-Chairman (Electrical)</i> .....	V. A. McKillop
<i>Secretary-Treasurer</i> .....	T. E. Bingham
<i>Third Year Representative</i> .....	P. S. White
<i>Second Year Representative</i> .....	F. A. Sampson
<i>First Year Representative</i> .....	W. A. Nichols

The Club meets every Thursday during the academic year for the discussion of papers relating to mechanical and electrical engineering problems.

CIVIL ENGINEERING CLUB  
1923-1924

<i>Hon. Chairman</i> .....	Prof. C. R. Young
<i>Hon. Vice-Chairman</i> .....	Prof. P. Gillespie
<i>Chairman</i> .....	W. H. Campbell
<i>Vice-Chairman</i> .....	H. G. Ratz
<i>Secretary-Treasurer</i> .....	D. C. Beam
<i>Fourth Year Representative</i> .....	A. R. Chadwick
<i>Third Year Representative</i> .....	C. E. Potter
<i>Second Year Representative</i> .....	R. E. Smythe
<i>First Year Representative</i> .....	J. P. Garwood

The Club is addressed during the academic year by practising engineers on modern methods and problems in civil engineering.

MINING AND METALLURGICAL CLUB  
1923-1924

<i>Chairman</i> .....	K. C. Gray
<i>Vice-Chairman</i> .....	G. Thompson
<i>Secretary-Treasurer and Third Year Representative</i> .....	R. Chowen
<i>Second Year Representative</i> .....	J. S. Dixon
<i>First Year Representative</i> .....	K. C. Grogam
<i>Chairman Entertainment Committee</i> .....	H. R. Brown

The Club is the official organization representing the undergraduates of Departments 2 and 8 of the Faculty of Applied Science.

The objects of the Club are to promote the spirit of good fellowship and mutual assistance amongst its members, both graduate and undergraduate, to provide a means of meeting together, and for the discussion of pertinent topics.

## ARCHITECTURAL CLUB

1923-1924

<i>Hon. Chairman</i> .....	J. M. Lyle
<i>Chairman</i> .....	E. M. Coleman
<i>Vice-Chairman</i> .....	W. C. Cooper
<i>Secretary</i> .....	J. Ryrie
<i>Treasurer</i> .....	H. M. McLaughlin
<i>Third Year Representative</i> .....	W. L. Fawcett
<i>Second Year Representative</i> .....	R. Fisher
<i>First Year Representative</i> .....	G. K. Carroll

## FACULTY OF APPLIED SCIENCE

## STUDENT CHRISTIAN MOVEMENT

The Student Christian Movement recently organized in the Faculty takes the place of the Young Men's Christian Association, which has held a place here since 1905. The aims of this Movement are to develop true Christian manhood and to be of assistance to students in many ways. Bible study groups are conducted, conferences arranged and students are given help in finding suitable rooms, etc.

## OFFICERS FOR 1923-1924

<i>Hon. President</i> .....	Prof. R. W. Angus
<i>President</i> .....	J. Beatty
<i>Vice-President</i> .....	H. W. Papst
<i>Secretary-Treasurer</i> .....	H. Ruggles

## UNIVERSITY OF TORONTO STUDENTS' ADMINISTRATIVE COUNCIL

## REPRESENTATIVES FROM ENGINEERING SOCIETY

<i>President—Engineering Society</i> .....	W. A. Osbourne
<i>Fourth Year Representative</i> .....	W. J. W. Reid
<i>Third Year Representative</i> .....	H. C. Smith
<i>Second Year Representative</i> .....	D. W. Dow
<i>First Year Representative</i> .....	T. B. Smith

## LODGING AND BOARD

Accommodation is readily obtainable in numerous private boarding-houses within convenient distance of the University, at a cost of from twelve dollars a week upwards for comfortable lodging with board; or rooms may be rented at a cost from six dollars a week upwards, and board obtained separately at about seven dollars per week. A list of accredited boarding-houses is kept by the Secretary of the Students' Christian Association, and students are recommended to consult him with reference to the selection of suitable accommodation.

## UNIVERSITY RESIDENCES

By the generosity of Mr. and Mrs. E. C. Whitney and other friends, the University can now offer to some hundred and fifty men the peculiar advantages of residential life and excellent accommodation within its own grounds. The Residence, opened in November, 1908, consists of three Houses situated on the north side of Hoskin Avenue, opening upon a quadrangle, the fourth side of which is formed by Devonshire Place. They stand about two hundred yards to the north of University College and close to Hart House. The buildings are known as the South, East and North Houses.

Each House contains twenty-four single rooms, one single suite, one double room and eleven suites, a suite comprising a study and two bedrooms. A large room in each building, with an open hearth has been set aside as a common room. A lavatory with hot and cold shower baths is provided for every eight men. The buildings are heated by steam and lighted by electricity.

The University supplies the table, chairs, book-case, chiffonier, bed, mattress, pillows, linen and window shades for each room; it is prepared to furnish a drop-light for a nominal rental.

The rates are \$4.00 per week for a single room or half of a suite, and \$5.00 per week for a single suite. The rental for the Michaelmas Term is payable in advance in one instalment, that for the Easter Term is payable in two instalments—\$50.00 at the opening of the term and the balance on April 1st. These charges cover heat, light, house-service, house-laundry, and the use of the telephone. There is no separate dining hall connected with the Residence, but board may be obtained at the adjacent University Dining Hall in Hart House.

Applications for rooms must be made in writing to the Secretary of the Residence Committee (address the Registrar's Office) and must be accompanied by a deposit of \$5.00. This deposit will be returned if the application be not granted, and will be forfeited if a room is assigned to the applicant and not taken by him, unless notice of his refusal of the room be received by the Secretary in writing before September 15th. It will be returned in full at the end of the College year if the room key be given

back and the room and furniture left in a satisfactory condition. The following principles govern the allotment of rooms: (i) No student who, as a result of the annual Spring examinations, is not assured of being able to proceed to a subsequent year, will be admitted into the Residence. Exception to this rule will be made in the case of a student in the Faculty of Medicine who has obtained standing at the May examination, but is debarred by the rules of that Faculty from proceeding to the subsequent year until he has passed his Supplemental examinations. Such a student will be assigned a room provisionally, but cannot occupy it unless he passes his Supplemental examinations in September. (ii) The rooms in each House will be distributed between the various Faculties and Years. (iii) A limited number of rooms will be reserved for members of the incoming First Year until September 12th. (iv) Applications will be considered in order of priority.

The University lays down three general rules, designed to prevent hazing, the use of intoxicants and gambling. The students in each House shall elect a House Committee, which is entrusted by the University with the making and enforcing of any other needed rules and with the maintenance of order. A member of the Faculty resides in each House to act as friend and adviser to the men in residence.

#### SUMMARY OF STUDENTS REGISTERED

SESSION 1923-1924

Departments	1	2	3	4	6	7	8	Total
First Year.....	24	8	15	9	23	42	4	125
Second Year.....	27	8	30	6	18	37	1	127
Third Year.....	22	8	31	10	25	48	6	150
Fourth Year.....	35	8	32	6	30	53	1	165
<hr/> Total.....	108	32	108	31	96	180	12	567









